ELECTRICAL REVIEW

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23 SEPTEMBER 1955

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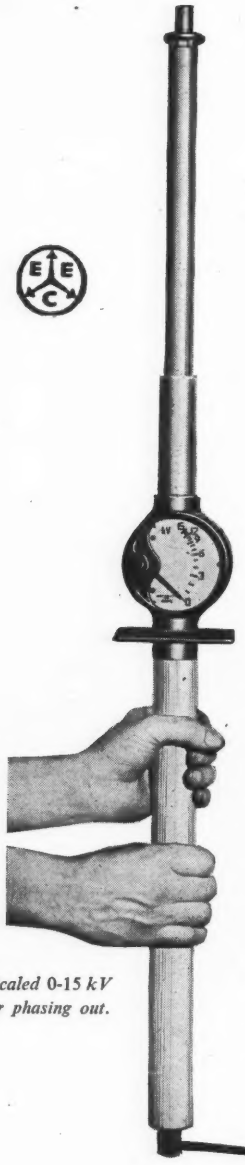

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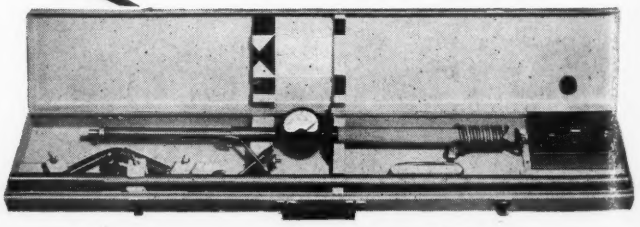

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ELECTRICAL REVIEW

23 September 1955 Vol. 157 No. 13 Established 1872

Creative Diversity

ALTHOUGH the year-by-year heightening of a system load curve above the base line aptly reflects a satisfaction of consumers' requirements up to a point, it is only a passive indication of an existing state of affairs. The dominant theme of this week's UNIPEDE congress in London, reported in this issue, may be regarded as the need for a close knowledge of the many diverse factors that give the load curve its resultant shape in order to raise its height more quickly and more economically.

Three aspects of diversity are considered. The first is the varied time incidence of consumers' demands; the second arises from the differing characteristics of power resources; the third is due to the several experiences of engineers in methods of exploiting the other two. Broadly, the greater the geographical area covered, the greater the opportunities of gaining advantages from diversity. This implies physical interconnection of national transmission systems at the higher voltages made feasible in recent years, thus reducing the amount of more costly generating plant required. Consumers' peak demands vary from country to country with longitude, climate, prevailing weather, nature of terrain and social customs and with types of industries and the apparatus in common use. To forecast their effects, which profoundly influence the cost of providing plant, increasingly necessitates the development of statistical methods and their correct interpretation.

To get the most out of natural resources, whether coal, water power, oil or nuclear fission, is largely a problem of dovetailing their operation to suit their individual characteristics, which are liable to be modified by time and circumstances. Thus newer techniques in constructional work for hydro-electric stations permit the development of relatively inexpensive schemes for low load factors, now that the end of more readily accessible sites with large storage capacities for dealing with base loads is in sight.

While such arrangements are possible through technological advances, their fulfilment involves political and administration questions also. A good example of what can be done in this way is the international pooling of Austrian water power described at last year's World Power Conference. Another example of the need to consider more than electro-technical matters is in the comparative costs of transmitting electricity and transporting coal; the value to the community of freeing the railways from the burden might well be a deciding factor. While the conditions that determine practice in one country may not prevail in another, adaptation to local circumstances may often be advantageous. The stimulus to thought given by international gatherings, such as that of UNIPEDE, is by no means the least of their merits.

DISSIPATION OF RESOURCES ?

There are people who rail against the nationalized services because of their alleged bureaucracy and unbusinesslike habits. Also there are people who protest when the national boards advertise their services. Very frequently they are the same people. Another letter appeared in *The Times* last week the writer of which says that " thinking people have been perturbed at the expenditure of effort and money by the electricity and gas industries in competing with each other for public favour "; he asks whether there is no one who can control " this dissipation of resources." He seems to be unaware that control has already been exercised upon the electricity supply industry, quite wrongly we think. If advertising is recognized as an essential feature of all business there is no justification for precluding nationalized industries from employing it. Electricity and gas are commodities which have to be sold, similarly to others of a less essential character, and the greater the use the lower the price. The fact that they are apparently in the hands of monopolies makes little difference—in fact competition between them prevents them from becoming absolute monopolies and should therefore be welcomed.

SIGN MAKERS' WORRIES

G. K. Chesterton is said to have remarked of New York's Great White Way that it was the paradise of the illiterate. What he meant was (if explanation is necessary) that the feast of light was heavenly but the messages which the electric signs carried were something less than that. There is no doubt that illuminated signs give life to our towns after dark and have a beneficial effect upon those who find it necessary to be abroad in the evenings. Some are crude, of course, and some actually objectionable and consequently a measure of control is necessary. It is possible, however, that the controls which have been instituted here are too indiscriminate. Permission to erect a sign is granted or withheld by local planning authorities whose decisions may be reviewed on appeal by the Minister of Housing and Local Government. There seems to be no real criteria by which the local authorities and the Minister can assess a sign's acceptability or undesirability; it is left to their unguided (or misguided) judgment. The sign makers and their customers are naturally worried by this uncertainty. They would like the matter to be thoroughly investigated with a view to improving the conditions but they are not hopeful that anything will be done.

COAL DEFICIT

An estimated deficit of over £19 million during the second quarter of this year reported by the National Coal Board presages another increase in the price of coal before very long. This again will have its repercussions upon the prices of all commodities particularly electricity and upon our economy generally, adding more to production costs and export prices. During the quarter less coal was obtained at a higher price largely because of increased imports which cost far more per ton than they did a year ago. In the first eight months of this year monthly imports averaged about a million tons—a rate which is expected to continue for the rest of the year. The loss to the Board during the second quarter was almost £7 million. As much of the imported coal comes from the United States, there is a loss of dollars. Little hope of immediate improvement seems to be offered and the need for speeding up the atomic energy programme becomes more apparent.

PUBLIC LIGHTING LOAD FACTOR

During the discussions on the papers at the Conference of the Association of Public Lighting Engineers last week, reported elsewhere in this issue, there was a good deal of discussion of the possibilities of load factor improvement by means of public lighting, particularly in respect of the large amount of street lighting which is nowadays switched off completely at about 11 p.m. or midnight. There seemed to be two schools of thought on this matter, one representing the Electricity Boards which held that load factor improvement for public lighting could not be sufficient to warrant the night-load tariffs called for in some quarters, and one representing the municipalities who asked for special night-load tariffs on the score of load factor improvement. We do not suggest that the general adoption of all-night lighting is likely to have a very appreciable effect on the national load factor or on that of any one of the Area Boards, but we do feel that the additional all-night load should be given the same consideration by the Boards as that given to any other night load—water heating for instance.

ALTERNATIVE TELEVISION SERVICE

Yesterday we had for the first time in this country two television programmes from which to choose for our evening's entertainment. The second programme was radiated by the new 10 kW transmitter of the Independent Television Authority at Beulah Hill in South London. The programmes themselves will originate from the studios of Associated Rediffusion from Mondays to Fridays, and Associated British Cinemas during the week-end. The transmitter, which is described in this issue, will be supplemented shortly by a second equipment to bring the total effective radiated power up to 120 kW, while ultimately, when the permanent transmitters have been built, the output will be effectively 200 kW. We have already seen the weekday studios and they are very well equipped indeed, with all the latest devices and apparatus for lighting, sound and vision control.

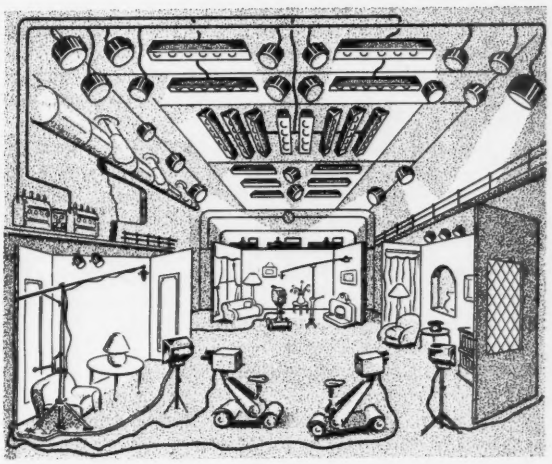
CENTRAL AUTHORITY'S REPORT

The Seventh Report and Statement of Accounts of the British Electricity Authority covering 1954-55, the last year before the separation of the Scottish Areas and the change of name to the Central Electricity Authority, is due to be published next week and we hope to review the Report in our issue of 30th September.

Television Studio Lighting Equipment

Survey of Present Technique

By W. C. PAFFORD, A.C.G.I., D.I.C.*



General impression of a television studio

A REVIEW of television studio lighting equipment and technique at this stage of its development can only be of a superficial nature, but at the same time it presents a formidable field of exploration. It would be unwise to approach the subject in the same way as an illumination engineer would deal with one of the more established branches of the industry. Even to assume a parallel with established practices in, say, the art of theatre stage lighting, would be misleading.

The best practical comparison that can be made is with the lighting techniques used in film studios. When 405-line television first started in this country in 1936, much of the lighting equipment was identical with that used in film studios, particularly as the first television camera (the Standard Emitron) required between 200 and 300 ft-candles of incident light, a level which was of the same order as that used for filming. The film industry had, in fact, already developed a very wide range of lamps and auxiliary equipment which was admirably suited for television. In other words, the tools for the job were already made; it only remained to learn how to use them, and how to arrange the lighting installation and the grouping of various types of lamps in such a way as to give the lighting engineer maximum scope in photographic and artistic control.

Lighting Engineer's "Canvas"

I would like to digress briefly in order to draw an analogy between the methods of the lighting engineer and those of an oil-colour artist. In the case of the artist's studio, his "light sources" are his oil-colour paints suitably "rigged for use" on the palette. His canvas is the "acting area" in his studio. He generally arranges to have a good deal more paint available than he will actually use. But the ultimate outcome of whether the picture is successful depends not so much on the total quantity of paint available as upon its distribution on to the canvas. This is a process which calls for maximum flexibility, imagination, and freedom of movement. There is little for the artist to complain about, for he is in sole control of his creative efforts. In television, however, the lighting engineer is not usually in sole control of the "paints and canvas," apart from the limitations of the equipment.

To resume, it must be said that television could not simply use the same lighting technique as that used for filming, mainly because of the severe limitations imposed by the television cameras but also because television producers almost universally adopt the multi-camera technique in the studio.

The limitations referred to above have, in fact, increased in recent years with the advent of the highly sensitive image-orthicon television camera tube. Although this camera is many times more sensitive than the earlier ones, it is also subject to electronic defects if high contrast lighting is used, such as is commonplace in the film studio. This is undoubtedly compensated for by the fact that the image-orthicon camera can give good pictures at very low light values which means a correspondingly smaller number of kilowatts of lighting for any given studio production. The trend is therefore towards smaller lighting units for television, but so far manufacturers of lighting equipment have not set out to make lamps specifically for highly sensitive television cameras. It will be interesting to watch this trend developing with the advent of commercial television where the economics of lighting will assume a new importance. Another interesting trend is the development of improved lighting in places of public entertainment where television is penetrating. Sports arenas, for instance, are paying considerable attention to good illumination, and many of the floodlit football matches are played under excellent lighting conditions. In this case, the original method of using overhead floods evenly distributed around the pitch is being superseded by the use of groups of lens spotlights mounted on high towers in the four corners of the sports ground, and so adjusted as to give an even intensity of lighting over the whole of the ground. An additional advantage is that lens flares are reduced to a minimum.

Amount of Light Needed

Before describing the different types of lamps and equipment most commonly used to-day, it may be worth while to examine the fundamental requirements of the latest type of television camera tube. Basically, the image-orthicon camera requires a softer overall light than the film camera, and it is very important not to exceed contrast ranges of about 20/1. To do this, we must provide a general light level of about 10 ft-candles as a working basis. The aim of the lighting engineer is of course first to meet the technical needs of the television system and then try to achieve photographically the artistic requirement of the producer. Acceptable pictures can be obtained with only 10 ft-candles or even lower under favourable circumstances. (I have seen a first-class portrait of a young woman's head and

* Associated Broadcasting Company, Ltd.

shoulders lit with three 100 W lamps giving 3 ft-lamberts of reflected high light: also an actual TV broadcast from Ely Cathedral with good results at 4 ft-candles.)

Generally speaking, however, it is too precarious to work at such low levels in the studio where the switching on of odd lamps might ruin the balance, and it is also considered psychologically bad for the artists to be working on dimly lit sets. It is advisable, therefore, to work in the region of 30 ft-candles which allows a reasonable margin for modelling, effects, etc., and also ensures that the camera tube is working electronically on the linear part of its output characteristic. In addition, it allows the lens to be stopped down to about f.8 which gives maximum optical efficiency and a good depth of focus.

Balance of Lighting

A word about the elementary photographic requirements of the television camera may be helpful. Supposing we are lighting an announcer and draped background. It is usual to have a focus source as a key light at an angle to the camera as shown in Fig. 1 (the lamp could be a 2 kW lens spotlight on a high stand). The hard shadows from this lamp are then softened out with a filler-light placed on the other side of the camera (this could be a double broad or a 1 kW flood). To add sparkle to the picture we can introduce some back lighting directly behind and above the artist to be televised (this is usually a 500 W baby spot fitted with a " barn-door " to prevent flare into the camera lens). By carefully balancing these three light sources in relation to one another, it is possible to obtain a photographically good result. But complications arise in television when more than one camera is used, as obviously a portrait cannot be equally well lit from three different camera angles. Add to this the problem of microphone boom shadows and it becomes necessary to introduce a fair amount of compromise.

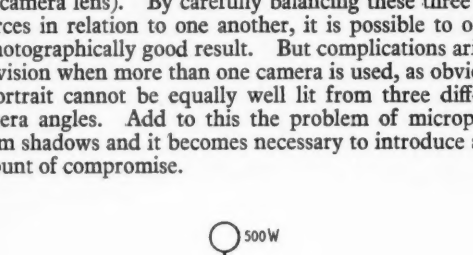


Fig. 1.—Three-point lighting for announcer

Fig. 2 gives a rough plot for a typical panel game in which it is no longer possible to use simple three-point lighting with a single key light. In this case it is often more usual to have two 2kW lens spotlights as three-quarter back lights which in effect are key lights used across the set. A soft frontal light is then hung above the cameras to act as a common filler, and the individual artists can then be treated separately as far as back light is concerned.

In fact, a complex studio production really consists of a number of such sets, say, nine or ten arranged around the studio each with its own lighting plot rather similar to the one already shown. Each set may require about 15 kW, so that a total studio load may be of the order of 150 kW. In any case a studio lighting installation should be capable of giving 200 kW a.c. and also a d.c. supply should be available for effects arcs if required. A further point about loading is that owing to long rehearsal periods, there is a good deal of continuous burning of lamps and a consequent heating problem. A generous ventilation system is therefore essential.

Coming now to the various types of lamps in use, it is safe to say that the trend has been in favour of incandescent filament lamps having a colour temperature of about 2,900 deg K, rather than towards the use of carbon arcs with colour temperatures up to 5,400 deg K. The excessive blue content is not suitable for the image-orthicon tube except, perhaps, for special effects such as moonlight or back lighting on ballet scenes, etc. In the same way there are similar objections to the poor colour rendering properties of fluorescent lighting, although it is possible to achieve quite good results using fluorescent lighting to provide the basic 10 ft-candles supplemented with incandescent spots. This arrangement works very well on outside broadcasts where the cameras may be touring a factory. In such a case, the factory lighting which would probably be overhead fluorescent strips, can be used with advantage when supplemented with incandescent lighting. For studio work where flesh tones are all important, the presence of fluorescent lighting in any quantity can be troublesome, although the discreet use of make-up can often counteract the harsh facial tones due to the use of this type of source.

Incandescent soft lighting is ideal for television and lamps are made in various forms. The five-light fitting is a trough lamp using five 1 kW lamps wired for use as two, three or five kW. It is ideal for large area frontal illumination and gives about 30 ft-candles at 50ft with a 20ft spread. Another lamp specially developed for television by Mole-Richardson, Ltd., is a smaller and lighter version of the above using four 150 W lamps, each lamp switchable, and the whole unit weighing only 32 lb. In addition, there are the standard 2 kW double-broads, 1 kW floods and 500 W baby cans. All these can be suitably diffused and are very mobile when used on floor stands. Key lighting for television is invariably carried out with an incandescent lens spotlight and these are available in sizes ranging from 10 kW to 5 kW, 2 kW, 500 W and 250 W (baby spot).

All these lamps are of robust construction with sheet metal housing and ample ventilation louvres. Bi-post lamps are used and these are available for 230 V or 110 V a.c. or d.c. The operation is, of course, silent and each lamp has a variable focus control allowing the beam to be used at full spot or full spread or intermediary position as shown in the curve, Fig. 3. A Fresnal type lens supersedes the earlier bull's-eye lens and mirror reflector which was found to be unsuitable for television owing to its uneven light distribution near the edge of the beam, a

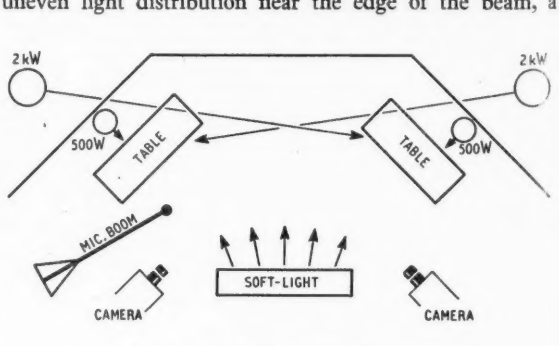
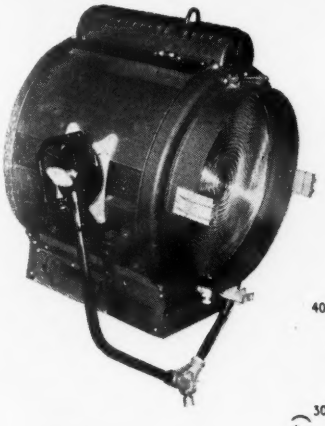


Fig. 2.—Typical plot for a panel programme



10 kW lens spot

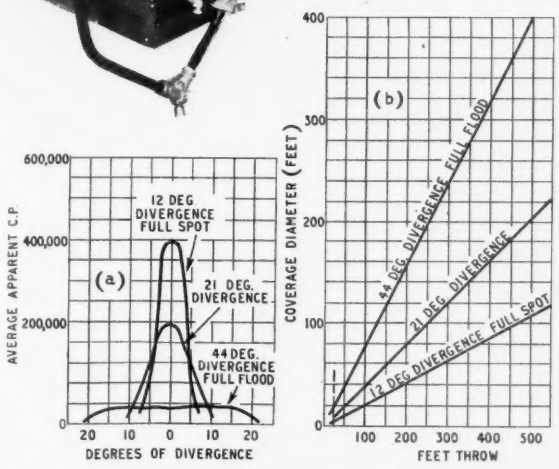


Fig. 3.—Curves for a 2 kW Mole-Richardson type 410 lamp

characteristic which becomes accentuated particularly when televising moving objects. Provision is also made for attaching colour filters, wire diffusers, and barn doors. As already mentioned, there are larger spots using carbon arcs working on d.c. Usually these are difficult to handle, rather heavy and costly to operate. Other special types of lamps are the effects spot which can be stopped down to give a clean spot at constant intensity; and more recently there have been developments with underwater lighting mainly for research purposes.

Future Trends

The question of future trends in lighting, as far as television is concerned, revolves around two important issues. First, the economics of rigging and operating complicated productions, and secondly, the unknown requirements of colour television.

The problem of rigging for a complicated show is mainly a matter of which system to employ for maximum efficiency and for ease of operation. The present method is to work out a lighting plot for the production and to employ a team of electricians to rig the lamps to lighting galleries and bridges as required. The lamps are then set under the direction of the lighting engineer and final adjustments made during rehearsal until the desired pictures are obtained for transmission. After the show, practically the whole of the lighting set-up is dismantled and stacked ready for the next production. This may entail working all night; in effect starting all over again rigging lamps aloft to a completely new lighting plot. The disadvantages of this method of working are the number of man-hours required before the scene is lit, entailing a studio being out of action for some considerable time, plus the wear and tear on equipment generally. The main advantage, of course, is that the lighting engineer starts with a clean slate on every production, and has time to move and place lamps exactly where he wants them, and in any manner of grouping which he thinks gives good results. It is a system borrowed from the film world and gives maximum scope to the individual lighting man, who in turn is able to give the producer the exact effect he wants. But the fact remains that it is not a system intended for a run of different productions in the same studio.

To handle this problem, it is necessary to have a semi-permanent overhead rig with ample groupings of soft light sources and focus sources at varying intervals along the lighting gantries, arranged in accordance with past experience so that almost every type of show can be lit from lamps already rigged. It is possible, for instance, to divide a studio into four, and to arrange four groupings of soft frontal light, together with a combination of 2 kW lens spots for key lighting, and a number of smaller spots for back and modelling light. Other lamps could be left free to travel within limits and it is a fairly simple job to group all soft lights on to dimmers and similarly for focus sources. By this means it is possible to light and set up for, say, four shows in one studio, each show following immediately after the other, and lit on cue. Control of individual lamps by remote switching and dimming also opens up possibilities of introducing subtle lighting changes during a television transmission, but I feel that there is a good deal of thinking to be done before advocating that. The disadvantages of such an installation are the initial cost which is necessarily high because of the large numbers of lamps which are permanently rigged and probably not used very often. Also it is not quite as tidy or flexible as the original method, but does provide an installation giving remote control to the lighting engineer and a system able to cope with colour television.

Television in Colour

It might be appropriate to conclude with a few comments on colour, although, naturally, practical experience in lighting for colour television is extremely limited. Ruling out the use of colour lighting as impracticable, a comprehensive overhead lighting installation similar to the one already described, would enable colour productions to be pre-lit in the same way as for black and white. Also it would be possible to control colour harmonies to a small extent by discreet use of dimming controls. No doubt colour will bring many new problems but these are likely to be almost the opposite in character of those encountered by the lighting engineer working in monochrome television.

With the latter, the problems are those of creating illusion in black and white, of trying to capture a mood or to put across a bright and gay atmosphere and so on. With colour, the emphasis will more likely have to be on restraint. The eye is fairly tolerant to monochrome and it accepts a great deal of poor tonal quality without complaint. But the eye reacts strongly to the slightest clash of colour, and it will take a trained eye to produce harmonius results. On the other hand, colour tonal distinction is no longer a function of lighting intesity, and to this extent the job of lighting for colour becomes that much less difficult.

To sum up, it would appear that lighting equipment of the future is not likely to change very much apart from a trend towards smaller units and remote control, while the function of the lighting engineer would appear to be slowly developing towards that of artistic direction.

Lubrication and Wear

The Council of the Institution of Mechanical Engineers is arranging a conference on lubrication and wear to be held from 1st to 3rd October, 1957, inclusive.

VIEWS on the NEWS

By REFLECTOR

MUCH has been said about the need for electrical people to "take their own medicine." Their friends and acquaintances are apt to wonder whether electrical appliances are all that is claimed for them if they find that the electrical men themselves are using some other form of heating and cooking. Not only electrical individuals but electrical concerns are prone to go outside the industry for their equipment and this is noted by the Press and others. I have just seen a report in a local paper of the opening of a canteen at an electrical factory in which it is said:—

"Despite the association with electricity in the firm's name, the well-equipped kitchen is run chiefly on gas."

There is scope for much missionary work among electrical people themselves before we start converting others.

* * *

Whatever it may be held to mean, the word "automation" is now firmly established in the modern English vocabulary. I suppose the strict form should be "automatization" and so the man who cut out two syllables is worthy of recognition. But who was he? Evidently American: but there are at least two contenders for the credit. The British Institute of Management says that the American Press names Mr. John Diebold, an authority on the subject, as the coiner of the word. But in *Indian Commerce and Industry*, Mr. Frank G. Woollard says very definitely: "The term 'automation' was introduced by a man named Del S. Harder . . . vice-president of the Ford Motor Company in the U.S.A." No doubt others will stake claims to the invention.

* * *

Everyone has his own ideas of relative values. Dr. Frank Mair, the senior medical officer of health for Northern Ireland, told a Congress of sanitary officials recently that refrigerators should come before television sets. Refrigerators were the answer to the country's food-poisoning problems, he said. But another speaker said that refrigerators came fifth in the housewives' choice, after radio sets, washing machines, electric cleaners and T.V. (Where do cookers stand?) In such circumstances there may be a danger not only of food poisoning but mind poisoning as well.

* * *

One of my greatest stand-bys is the fish story. It is strange how often electricity and piscine life become intertwined. The latest in this continuing story comes from Uskmouth, Mon., where the Central Electricity Authority proposes to build a second power station. The approval of the Usk River Board was sought by the C.E.A. but at a meeting last week the Board withheld approval because it could not foresee the result of the power station's operation on salmon fishing in the river. It was held that the discharge of cooling water into the Usk would raise the temperature to a height which would endanger the life of the young salmon. The matter is to be discussed with the C.E.A. and the Ministry of Fuel and Power. In the meantime work on the power station, which was to have started early this year, is held up.

* * *

At last week's Gas Sales and Service Conference at Ayr a journalist, Mr. S. Dodd of the *Birmingham Post*, offered a number of suggestions from the customer's point of view. He considered that "automatic" cooking was now a necessity and that was where electrical devices could help the gas industry to solve its technical problems of time-controlled cooking. He also thought that the design of gas domestic washing machines was out of date. They should be equipped with electrically-powered wringers and there might also be a drying-airing cabinet. I can never understand why people should want electrically-equipped gas appliances. Surely it is much sounder, safer and satisfactory to employ purely electrical equipment.

* * *

It seems that the North of Scotland Hydro-Electric Board is responsible for the employment of juvenile labour in Scotland—not directly of course and not in its own area. Before the Board began its operations in the Highlands it was customary for the Lowlands to experience an invasion of Irish (adult) labour to lift the potato crop. Now these Irishmen can earn as much as £25 a week and, naturally, are not interested in potato lifting any more. These facts were brought up at a recent meeting of the Edinburgh Education Committee when it was reluctantly decided to release children from school to help with the potato harvest.

* * *

A writer in the *Daily Express* tells of the explanations he has had to make to would-be benefactors about the chain he has trailing from his car. It is there of course to dispose of static electricity. Static can have unpleasant and sometimes dangerous effects but the writer uses the chain for a quite unusual reason. He says that it prevents "car sickness" from the building up of a static charge. There may be something in this but I doubt it. The causes of car sickness lie elsewhere I believe.

* * *

Fifty years ago the great Electrical Exhibition at Olympia took place, no fewer than 250 firms participating. An amusing sidelight on the show is the following Corps order of the Electrical Engineers, R.E. (Volunteers) published in the *Electrical Review* of 22nd September, 1905.

"GUARD OF HONOUR.—The Corps furnishes the Guard of Honour at 1 p.m. at Olympia for opening of the Electrical Exhibition on Monday, 25th inst. The O.C. wishes that members of the Corps attending this Exhibition will do so in uniform, and he will try to obtain special rates or passes for those who do so.—(Signed) Wilfrid C. Dumble, Capt., R.E., Adjutant."

Loading Coils for Telephone Systems

Developments in "Unicoil" Loading

By G. W. V. BUCKLE, A.M.I.E.E.*

SINCE the introduction of loading coils in line telephony to reduce the attenuation over the effective frequency range, manufacturers have devoted much effort to reducing the sizes of the coils without in any way degrading their performance. Miniaturization has in some cases tended to improve the characteristics of the coils. Experience for over 30 years still favours the toroidal cored coils, particularly on account of their inherent stability. The success of the manufacturers is illustrated in Fig. 1, which depicts the reduction in size of loading coils having similar performances between 1924 and the present time.

The reduction in volume of the individual coils is reflected in the sizes of their containers. The relative decrease in the sizes of cases intended for installation in manhole entry underground chambers is shown in Fig. 2. The cast iron enclosing type of case is shown for the period 1924 to 1931, compared with the welded steel container used between 1931 and 1950, and the present size of case introduced in 1951 incorporating smaller loading coils. All these cases are designed to contain 108 coils.

This progressive reduction in volume has meant that in the final enclosing case, the space required for opening the end of the stub cables and spreading the stub cable conductors for connections to the coils, in what can be described as a "wiring chamber," now constitutes a large proportion of the total volume. In fact, in loading coil cases of the conventional design for 14, 104 and 542 coil pots of the Grade 3 size, this "wiring chamber" volume represents approximately 40 per cent, 25 per cent and 22 per cent respectively of the total volume of the case.

Similarly, in cases containing Grade 2 and Grade 1 coils, while the relative proportions are slightly reduced, the ratios remain approximately the same.

Stub cables are fitted to the enclosing cases for connecting the coils in the main cable, thereby giving the cases containing a small number of coils a particularly "top heavy" construction.

The introduction of these manhole loading coils into the line, therefore, necessitates the use of this additional stub cable which may have d.c. ohmic resistance values of approximately 0·85, 0·55, 0·25 and 0·13 ohm for 6½ lb, 10 lb, 20 lb, and 40 lb, conductors respectively. The insertion of such loading coil cases into the line also entails the making of two extra joints.

This state of affairs was realized soon after the introduction of the smaller toroidal coils, and a technique was soon developed whereby individual coils could be used for loading selected pairs of conductors in the main cable for special purposes. In this "Unicoil" system, each coil is vacuum dried and impregnated under pressure with a high quality micro-crystalline wax after being enclosed in a sealed tinned iron container to give the maximum electromagnetic and electrostatic screening to the coil. This ensures that when the coils are placed adjacent to each other, the possibility of "cross talk" between the coils is reduced to the absolute minimum. The coil terminations are four tails of a flexible-stranded conductor insulated

* Salford Electrical Instruments, Ltd.

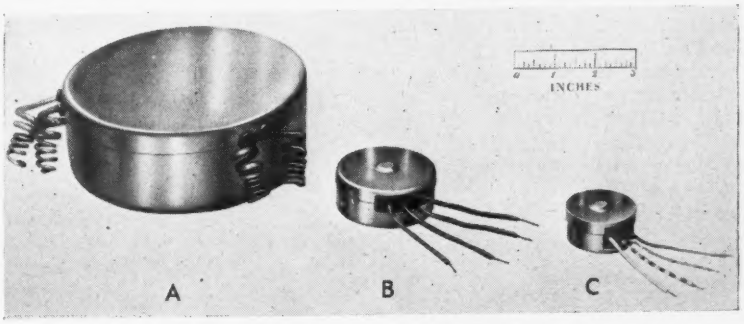
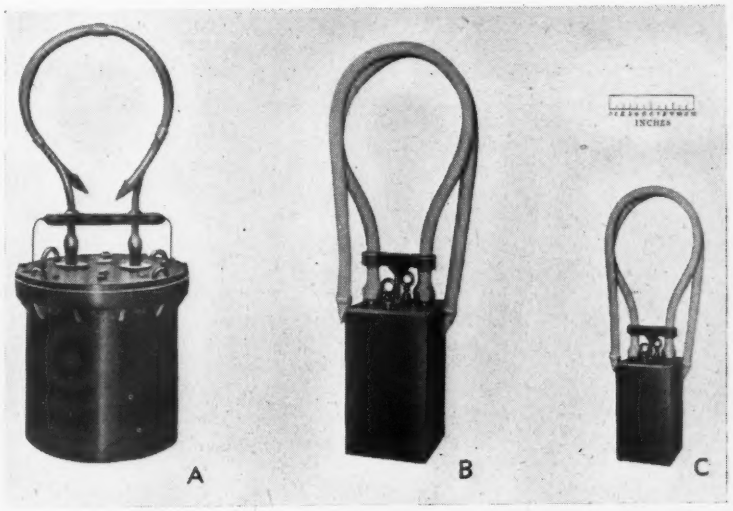


Fig. 1.—Reduction in size of loading coils for similar performance:
(a) Up to 1931 with an iron powder core.
(b) 1931-1950 with a nickel-iron alloy core.
(c) 1951 with a copper-nickel-iron alloy core

Fig. 2.—Reduction in size of loading coil manhole cases with the same advances as in Fig. 1



with a polychloroprene sheath brought out from the coil through neoprene bushes in the enclosing case. The whole coil is virtually hermetically sealed, ensuring that the insulation resistance will be unaffected by possible subsequent exposure to humid atmospheres during installation. The tails can be screened as pairs where required, e.g. for " programme coils," and the screening can be made continuous with the screening container and that on the line conductors.

When shipped, this type of coil is enclosed in a drawstring bag of a specially selected textile material having a very low conductivity value. This bag serves the additional purpose of insulating the metal container, if so desired, from the other conductors in the joint. To ensure that the coil is adequately protected in transit and during storage periods, it is completely sealed in a disposable polythene envelope. These coils have been used by the British Post Office generally for loading music circuits and the individual coils have become known loosely as " Unicoils." One, two, three or four coils have been used for this purpose, and are merely held in position in the joint by the surrounding conductors as shown in *a*, *b*, *c*, Fig. 3, where four " Unicoils " can be seen jointed to the selected conductors (*a*), inserted between the co-axial tubes in this particular cable joint (*b*), and finally the joint complete, ready to receive its lead sheath (*c*).

This practice has proved most successful on new lines for loading a small number of pairs, and in joints on old lines where unloaded pairs were available which could be used for line maintenance purposes or for minor extensions. The system gives a measure of flexibility and employs normal methods of jointing; the jointer instead of making a joint of conductor to conductor, makes joints of the conductor to the flexible tails from the coils, thereby inserting the desired loading.

Typical " Unicoils " are shown in Fig. 4, in which can be seen the four tails of flexible stranded conductors insulated with the polychloroprene sheath.

At points where a spur cable is taken from the main cable, and where the loading of pairs in different directions has to be staggered, it has been found to be an advantage to use " Unicoils " in the joint at those places where the minority of pairs require to be loaded. For loading one or two pairs for telephony in a multipair pilot cable, " Unicoils " have been installed in a joint at an estimated total cost approximately one-quarter of that for the special pole mounted case previously installed.

For many years the British Post Office, among other telephone administrations, has used sheet iron canisters, approximately semi-circular in section with lead sheathed

Fig. 4.—Typical " Unicoils "

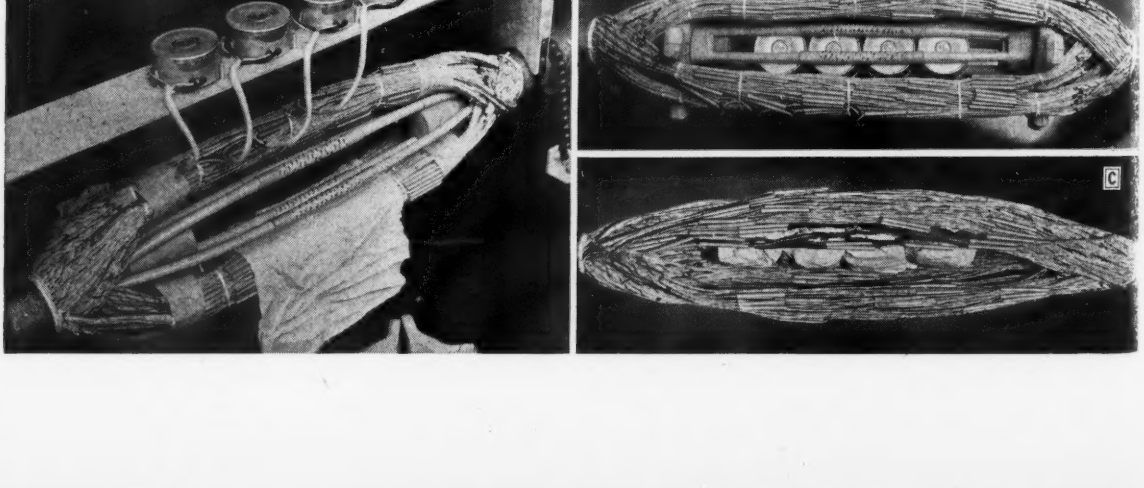
tails from the contained loading coils. These canisters contained up to five coils, so that with two such canisters forming a complete circle, up to ten coils could be inserted in a joint. Another method consists of inserting into the main cable by means of a small lead-covered unit, one or two coils to provide additional loading for one or two pairs for line maintenance purposes. This unit has appeared as an appendage from the stub cable joint to the main cable. It will readily be appreciated that the use of " Unicoils " offers considerable advantages over both these methods, giving much easier, neater and more economical construction.

" Multiple Coil " Units

The " Unicoil " system is very suitable where small numbers of coils have to be accommodated in a joint, but large numbers of loose coils would be extremely difficult if not impossible to handle. Under these circumstances the " Unicoils " can be built into a multiple unit. The unit consists of columns of coils secured between end-plates by long studs, the end-plates carrying an arrangement for clamping to the sheathing of the ends of the cable, between which the unit will be inserted. The unit, clamped to the two ends of the cable in this manner forms a rigid member with the cable sheath. The conductors of the main cable can be connected to the loading coil tails, and the joint completed in the normal manner.

For this system to be a practical success, the number of coils which can be accommodated in a single unit is limited to 104 of the Grade 3 type. Such a unit or block consisting of four columns, each containing 26 coils complete with supporting brackets and clamping arrangements, would weigh approximately 34 lb. Assuming that this was applied to a scheme using standard lead-sheathed cable the completed joint would be approximately 30in long and

Fig. 3.—Method of loading a joint using " Unicoils." (Reproduction by courtesy of H.M. Postmaster General)



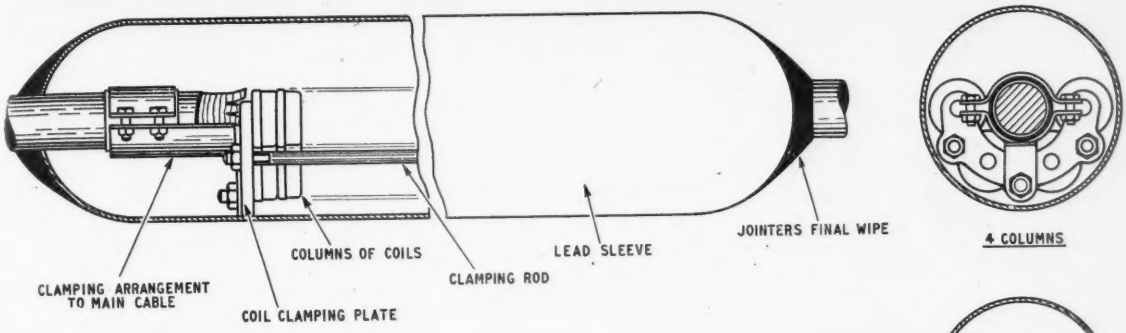


Fig. 5.—Multiple coil unit assembly

6in diameter. Similarly, a unit of 38 coils of the Grade 3 type would weigh 15 lb and the completed joint would have an overall length of approximately 18in and $4\frac{1}{2}$in diameter. The total weight of such joints when completed with lead sleeve, wipes, and internal connections would approximate to 70 lb for the former and 25 lb for the latter, and it is felt that the joints should be properly supported.

A conventional loading coil case containing 104 coils would weigh 170 lb, and a 38-coil case would weigh 115 lb. The use of multiple-unit coils will result in a great saving of space in normal manhole entry underground chambers, particularly on extension work and where floor space in these chambers is already occupied.

The columns of coils are arranged on a section of the periphery of the enclosing case of the joint. This leaves the maximum space available for jointing, and the centre of the joint free for connecting special conductors, such as co-axial tubes, through in a straight line in the line of the cable run. Where unloaded pairs are included in the main cable, these can be taken through the joint without special provision, and in the correct arrangement of the main cable.

From the above it will be seen that by assembling " Uni-coils " in " multiple coil " units to suit the number of pairs to be loaded in a cable, and by building these units into a joint, the stub cables of conventional loading coil cases can be eliminated. The two additional joints of these stub cables to the main cable are thus replaced by one joint containing the coils. The final appearance is that of a somewhat enlarged joint between two lengths of cable.

Another important feature of this system is that it could tend to eliminate the construction of special manhole entry underground chambers for cables within the range of the numbers of loading coils suggested. The units in their completed joints could instead be accommodated in normal " surface box " jointing chambers.

For lead-sheathed cable schemes, the system gives a continuous lead envelope to the cable and loading points, and therefore eliminates the possibility of damage to loading coil cases by soil water corrosion during service.

Fig. 5 shows the drawing of a typical assembly of these loading coils, from which it can be seen that there is ample space for wiring, and that all the jointing can be done from the top of the unit.

Fig. 6 shows an early arrangement of an 80-coil unit of the original design before packing for shipment. The unit of assembled columns of coils is shown with the tails taped in, and it is wrapped in the polythene tube before sliding into the lead sheath at the side of the photograph. A silica gel desiccator was included in the package.

Lead sleeves can be of the straight type or of the divided or split type. The latter would be preferable on long joints

1 COLUMN.....1 TO 10 COILS
2 " .....11 " 54 "
4 " .....55 "104 "

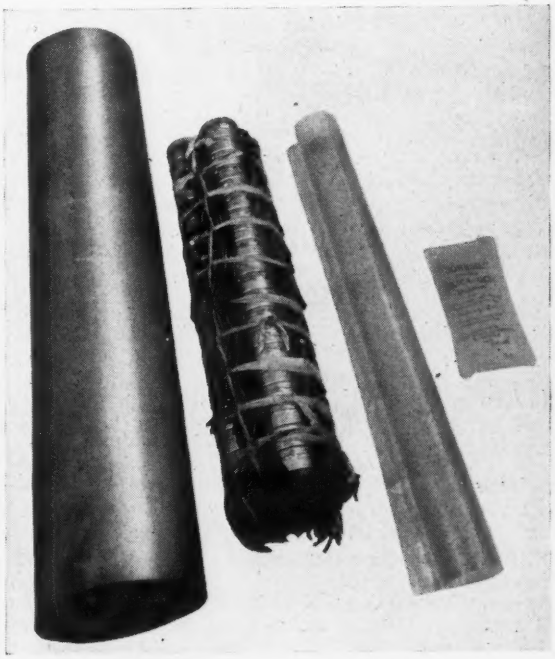


Fig. 6.—Original method of arranging 80 coils as a unit

or where there was a large difference between the diameter of the sleeve and the main cable.

It should be noted that the lead sleeve does not carry the weight of the joint, and for the largest size of joint a lead collar reinforcing the cable sheath and taking the final wipes could be used.

The system is very easily applicable to the loading of cables for the three major types of line telephony, namely: Underground lead-sheathed cables in ducts with conventional manhole entry underground chambers; underground cabling with lead-sheathed and armoured cable, and direct buried loading coil cases; aerial cabling (not open wire) of the metal-sheathed or equivalent type with loading at normal distances.

The loading of conventional underground cables, of the first type, has already been adequately described in the

general explanation of the method, and does not require any further description.

The method of loading underground armoured cables of the second type, is almost identical to that for the straightforward lead-sheathed cable, but an additional cast iron case of the straight-through joint box type is provided to give mechanical protection to the lead-covered joint containing the coils and to clamp the armouring of the main cable. The cast iron box gives adequate support and anchorage for the main cable. The completed joint is finished in the normal way for such boxes, with an internally clamped copper strap to ensure continuity of the armouring circuit. The armouring clamps and end bushings are arranged on the lower halves of the casting, and provision is made for bitumen filling where required.

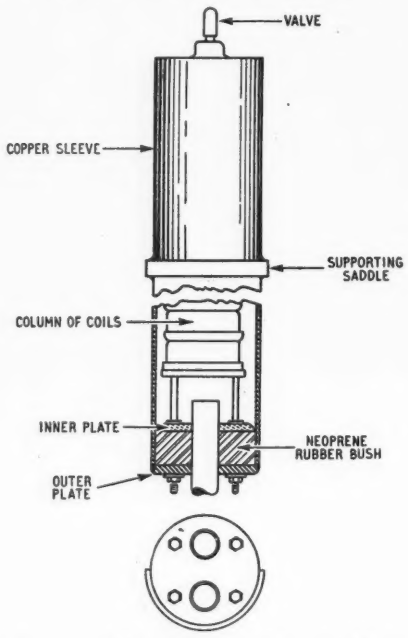


Fig. 7.—Arrangement for introducing loading to light polythene insulated cables

For aerial cables, having lead sheaths, the joint is again identical to that for the first type. Aerial cables having other sheaths, such as stainless steel or polythene, can also be loaded using this technique. When completing a joint on a stainless steel sheathed cable it must be realized that with such a joint, the stainless steel sheath ends at the brass ferrules, and the joint containing the coils is lead-sheathed only. A suggested design of loading coil unit for use with a light polythene insulated cable is shown in Fig. 7, and is based upon the standard arrangement of a compression type canister joint for this type of cable. Jointing techniques are thus seen to be similar in principle whatever type of cable is used.

The considerable advantages which can be claimed for the schemes mentioned in this article are the elimination of the sub-cables fitted to conventional manhole cases, resulting in a slight reduction in the d.c. resistance, but more important, eliminating one joint in the main cable run at each loading point; a reduction in weight owing to the absence of stub cables, sheet iron containers and wax fillings, and the simpler supporting arrangements; a considerable total saving in cost at each loading point, with the possibility of either a reduction in size of the manhole entry underground chambers, or their replacement by "surface boxes"; a saving of space in making new installations, while extensions to existing systems can be carried out without requiring additional space. Additional advantages are that the final joints are similar to those normally encountered in line telephone work, and connections are simple and of a type normally encountered by jointers; the scheme allows unloaded conductors to be continued through the joint; and dangers of case failure due to corrosion are eliminated.

The system is sufficiently flexible to enable loading arrangements to be readily altered. If, for instance, at some later date a loaded pair or pairs through the cable should be required for carrier working, the line could be deloaded with ease, the major work involved being opening the joints at the loaded points. Also the methods of loading any type of system are basically similar and coils are interchangeable.

Light Engineering Design

THE Regional Advisory Council for Higher Technological Education has issued a report prepared by the Regional Advisory Committee for Industrial Art and Design on ways of achieving, through modifications in existing arrangements for education and training, a closer attention to æsthetic considerations in the manufacture of light engineering products, including problems of recruitment to specialist courses in industrial design. The report is based on recommendations submitted by a specialist panel. The report states that prospects for qualified designers in the light engineering industry are good and should be more widely known. Students capable of qualifying for such a career will be found in both art schools and technical colleges. The report suggests that art students who wish to enter the engineering industry should proceed to full-time or part-time courses in the design of engineering products. These courses are at present offered at the Central School of Arts and Crafts and the Royal College of Art.

Interest in design might be stimulated in engineering students by special lectures on industrial design; judicious use of exercises set in engineering drawing; and adaptation, at some later date, of syllabuses of Final City and Guilds of London Institute courses in appropriate engineering subjects and in Ordinary National Certificate courses to allow for some study of industrial design. Engineering students selected for transfer at the Ordinary or Higher National Certificate or Final City and Guilds of London Institute stage should be offered a combined day and evening course extending over three or four years—in the first place at the Central School of Arts and Crafts—and application should be made to the Ministry of Education for this course to be recognized as one preparing for the National Diploma in Design with design of light engineering products as a special subject.

Geneva Papers on Atomic Energy

THE United Nations has announced the forthcoming publication of the proceedings of the International Conference on the Peaceful Uses of Atomic Energy, held in Geneva last August. The full proceedings will occupy sixteen volumes of about 500 pages each, constituting a complete, unabridged record and comprising all papers, whether presented orally or in written form, together with a record of discussion. For advance orders up to 31st December next there is a special pre-publication price of £39. Individual volumes may be ordered separately but no price has yet been fixed. Orders may be placed with any sales agent for United Nations publications, including H.M. Stationery Office.

Mimeographed copies of most of the individual papers read at the conference are available at 1s 9d each. Orders for individual papers, giving the full title and author, may be placed through H.M. Stationery Office.

International Electricity

THE 1955 CONGRESS OF UNIPEDE

THIS year's triennial congress of the International Union of Producers and Distributors of Electrical Energy (UNIPEDE), opened in London on Monday of this week and will terminate next Tuesday. This body, which was founded in 1925, is an association of organizations that in each of the affiliated countries primarily represent the interests indicated in its title. The last congress was held in Rome in 1952.

The opening ceremony took place on Monday morning, 19th September, when the presidential address was delivered by Lord Citrine in the dual role of president of UNIPEDE and chairman of the Central Electricity Authority. He welcomed all the delegates to this country and said that since the first congress in 1926 electricity consumption in the member countries had multiplied more than five times and the combined output was now well over 300,000 million kWh. This progress had been achieved despite the Second World War and was a fine tribute to those who foresaw the commanding position in world affairs which electricity supply was destined to play.

The next speaker was the Mayor of the City of Westminster, Councillor Patrick Stirling, J.P., and he was followed by M. Roger Gaspard, Director-General of Electricité de France and vice-president of UNIPEDE, who briefly sketched some of the points of interest connected with the conference and said that all the delegates would undoubtedly go back to their respective countries with a rich harvest of ideas, thoughts and feelings which would long remain in their memory.

Mr. Geoffrey Lloyd, Minister of Fuel and Power, then added his welcome to the delegates and referred to the cross-channel submarine cable with which engineers of Electricité de France and the C.E.A. were experimenting. The world was now approaching a second industrial revolution. The first revolution was accomplished without the help of electricity but now it provided the best means of satisfying the requirements of motive power and control in the automatic factory. In conclusion, Mr. Lloyd said he could foresee greater problems arising as atomic power came to play its part in meeting the world's demand for energy.

Above: Lord Citrine delivering his presidential address at the opening meeting of the Congress

An address entitled "British Thoughts on Nuclear Power" was then delivered by Sir Christopher Hinton, managing director of the Industrial Group of the United Kingdom Atomic Energy Authority. After outlining the White Paper which was published last February he said that Great Britain's need for developing a substitute for coal was pressing. At present we burnt about 36 million tons of coal a year for the generation of electricity and if the present trend of consumption continued consumption would rise to 100 million tons a year by 1975. This provided every incentive for the quick development of techniques for using nuclear power. The urgency of the problem in Great Britain was more insistent than in the United States and for this reason it was probable that the first nuclear reactors producing electricity in large quantities for industrial consumption would be those under construction at Calder Hall.

After discussing reactor types in some detail Sir Christopher said that we could expect to generate electricity in reactors of the Calder Hall type at a cost of 0·6d/kWh. If this could be done in the first nuclear power station it should be possible with development to make considerable improvements and to generate electricity from nuclear power at prices lower than those that could be achieved by the use of conventional fuel. Sir Christopher felt that the atomic energy power plant could look forward to falling capital costs and to falling price costs and its promise was therefore great, but he warned against too rapid development of the new source of power.

THERMAL GENERATION

After Mr. G. R. Peterson (1) had reviewed the work done by the Thermal Generation Study Committee since the 1952 Congress, M. Boudrant (2) examined the factors influencing the choice between solid or liquid fuel for a new power station and dealt with both separate and simultaneous

coal-oil firing. He showed that if a station was normally designed for coal firing, it was not very costly to arrange for oil firing in addition. Furthermore, the initial capital expenditure for a station designed for oil firing only was much lower than for one equipped for coal.

With regard to operating and maintenance costs the expenditure was about 20 per cent lower for an oil fired station. After discussing the operational requirements peculiar to multiple fuel fired stations, M. Boudrant concluded by saying that when considering the construction of a single station single-fuel firing was the best solution. For equipping on a country-wide scale, however, other factors must intervene, such as the possibility of extent of particular fuel resources. One would thus be inclined to limit the single-fuel stations to a maximum power corresponding to the security of supply, and to build multiple-fuel fired stations for the fluctuation corresponding to possible shortage of certain fuels.

When discussing the use of thermal power station ash Van Antro (3) described the investigations and research carried out to find a market for fly ash, the tonnage of which continuously increased in consonance with the generation of electrical energy. After analysing the chemical composition of fly ash he showed that aluminium, iron, germanium, copper, titanium and strontium could be extracted from it, but unfortunately this only affected a very small proportion of the quantities to be disposed of.

He then reviewed the possibilities of using this ash by incorporating it in building materials: concrete, cement, building blocks, and in road foundations. Work on this had reached an advanced stage in both Sweden and Germany, whereas in Great Britain, the Netherlands, Belgium and France it was only beginning. In the latter group efforts should be made to persuade the public authorities and the customers to adopt new materials which in many cases had real advantages over classical materials. Above all ash should not be considered as a wasted product but as a raw material.

Slag-Tap Firing

In recent years an increasing number of boilers using slag-tap firing had been constructed in Germany. Dr. Spennemann (4) explained that in slag-tap firing, the slag leaves the furnace in a liquid state, in contra-distinction to dry-ash firing, in which the ash passes to the ash-pit in the solid or dry form. Development began shortly before the war and had been continued in various ways. These had partly been determined by the fact that the constructional components well known for dry-ash firing, such as the burner and the burner arrangements were retained. In some directions completely new ideas were developed. The type of slag-tap firing to be selected from among those described depended on the requirements to be met. All types would nowadays give satisfactory service in meeting the requirements for which they were developed. The advantages of slag-tap firing to the operator could not be ignored. The most obvious were the possibilities of burning economically poor coals, and the solution of the inconvenient and difficult problem of fly ash. Tests had also been made on the burning of lignite by slag-tap firing. Development work, however, had not yet been completed. For example, there was still much work to be done on the fouling of boilers, so that the types of firing which had been developed, with their high furnace temperatures, could be used for long periods of continuous running, as required nowadays, at their highest efficiency.

When they dealt with the atmospheric pollution arising from power station operation, Mr. G. R. Peterson and Dr. H. E. Crossley (5) showed that the electricity supply industry in Great Britain was making a major contribution to the reduction of atmospheric pollution. Electricity provided a clean and convenient form of energy and the fuel used to produce this energy was so burnt as to minimize atmospheric pollution at ground level by smoke, grit or gases. The first part of the paper dealt with solid pollution in the form of grit or dust and described the precautions which could be taken in the design and operation of power stations to prevent the deposition of such solids in objectionable concentrations from chimney gases. The second part of the paper dealt with the control of gaseous pollution from power station chimneys and referred particularly to sulphur dioxide pollution.

The authors showed that not only had the electricity supply industry made more progress than any other towards the control of atmospheric pollution but it had also pioneered, and was still pioneering, technical investigations to determine the nature of atmospheric pollution and the contribution to such pollution which power station chimney emissions made. The electricity supply industry, which burnt more fuel on a single site than any other industry was presented with a special duty and problem to burn this fuel without causing inconvenience to the public.

Water for Cooling

The use of river water on the scale required at a large modern power station posed a number of operating problems which were considered by Messrs. G. R. Peterson and F. F. Ross (6). Probably the most difficult of these problems was that resulting from the rising of the temperature of the water used for cooling. This could be minimized by the use of cooling towers but their capital cost, the cost of power for pumping and the reduced efficiency which resulted from having warmer water in the condensers all obviously affected the economics of power generation.

Although nearly every industrial user of water polluted it to some extent, thermal electric generation only caused deterioration of river water which was of the highest quality, and then the slight deterioration was unimportant. When the river water was already so polluted that fish only lived with difficulty, then the use of such water for cooling purposes by a power station might result in an improvement. It was important for the economical production of power that the temperature limit imposed on water used for cooling should not be any lower than was really necessary to prevent injury to other interests. It was also desirable that pollution of rivers by other users should be kept to the minimum.

There is great advantage in being able to start up steam generating sets frequently and rapidly, but the accompanying necessity of making modern high pressure and high temperature equipment capable of being shut down at night or at the week-end renders the problem of shutting down and starting up more difficult. The report of Jean Ricard (7) which had been compiled following a summary inquiry among the power generating members of UNIPEDE had as its aim the study of this question. The report began by referring to the Consolidated Edison Company of New York which had for many years shut down sets rated at 1,250 lb/sq in and 900/950 deg F each night, being able to bring them up to speed in about twenty minutes, and had equipped its most modern machines with frequent shut-downs in view. The question was often limited to the problem of starting from the cold state but it appeared during preliminary discussions that it was more important to be able to shut down sets frequently under conditions of reasonable safety than to effect particularly rapid starting. However, the reduction of starting times in relation to those which were commonly accepted was likely to procure only small savings as compared with those from shutting the sets down. The gains

which were to be made in reducing the loading times were a little greater so it appeared that the main aim was to be able to carry out start-ups with sufficient certainty so that it might be possible to shut down sets frequently with safety. The reduction of starting-up times was only a secondary aim which had advantages, but would no longer justify either additional risks or large investments.

The author reviewed start-up procedures adopted by UNIPEDE members at the present time, followed by an examination of the causes of troubles attributed to starting and means that might be employed to prevent them. Although it was necessary to wait for operational proof from modern high temperature plant in order to state definitely, the control of temperatures and the application of rational ratings would probably bring about a solution to the problems of frequent shut downs. The report concluded by dealing with the special question of quick starting and reducing the costs of starting.

HYDRO-ELECTRIC GENERATION

The report by Mr. Charles Aeschimann (8) dealt with the problems being faced by many countries as their hydro-electric capacity became fully developed or exhausted. It then became necessary to develop the falls still available in such a way that the whole of the hydraulic power was utilized to the best advantage. When all hydraulic power had been exploited, thermal or nuclear power stations would have to make up the balance. He felt that the load curve would tend towards extended peaks and described the make-up of the probable daily load curve as having a base consisting of the output from run-of-river stations, a block of power above this made up of the output from thermal or nuclear stations, and the fluctuating portion of the curve made up of the output of storage stations. Such a situation would involve a decrease in the utilization period which would tend towards an increase in installed capacity in storage stations compared with that which would be likely to be put in at the present time.

A report by Dr. Ing. Carlo Semenza (9) summarized the evolution of river development schemes relative to recent progress in underground construction methods. The most numerous advances had been achieved in the field of tunnelling resulting in reductions in costs and increased speed of completion. Considerable progress had also been made in the technique of excavating the machinery halls of underground power stations. It was felt quite definitely that the placing of a power station underground made it possible to achieve the best layout for any scheme and rendered it to some extent independent of the characteristics of the site. Also a station could be situated where it best fitted into the river utilization plan, thus leaving unused the smallest possible proportion of the available head. Emphasis was placed on the importance of a general geological investigation of a site before construction began. This enabled the effective construction time for each part of a scheme to be predicted accurately and this was important where one part of a scheme took considerably longer than the remainder, as interest charges paid before production actually started could be reduced to a minimum.

M. Georges Bardon (11) dealt with the operation of steam power stations used for equalizing water power. In many countries of Europe this was an increasing problem due to the fact that the most favourable hydro-electric sites were now in use. With a visualized average annual increase in demand of not less than 5 or 6 per cent a progressive increase in new thermal electric power station construction was necessary in many countries. Some countries, for instance Austria and Sweden, did not have this as an immediate problem but even in Sweden consideration was being given to the necessity of changing over for basic output within about twenty years from hydraulic power to nuclear generation. Details were given of systems employed to establish at any moment the most economic operational arrangement as between the thermal stations of varying efficiency and the hydro-electric stations available. Flexibility of operation of thermal power stations designed for equalizing hydro-electric production was particularly important. The Italians hoped to achieve a technical minimum running rate for steam turbines of 15 per cent of the maximum power and hoped shortly to have generator sets of 70 MW capacity running at 1,700 lb/sq in, 990 deg F, and enabling a gradient of 4 MW/min to be obtained after running at minimum power for 2½ hours. The design of thermal stations would vary according to their amount of annual utilization in conjunction with hydro stations. For instance, in Sweden where an ordinary annual figure of approximately 1,000 hours' operation was common, it was particularly important to reduce the amount invested in such stations. Pressure and temperature were limited to moderate values so as to make use of standard materials. Austria had similar considerations to deal with.

The economic value of small reservoirs was dealt with by Dipl.-Ing. Werner Pietzsch (13). This paper covered the exploitation of hydro power from rivers, when the production of electrical energy was adapted to the daily characteristics of the river. With this object in view the harnessing of a river must be carried out in stages so as to hold up the flow of the river for a time in a series of small reservoirs and thus increase the quantity of water available at peak load periods. The practicability of producing power for peak loads was demonstrated by an example of an hydraulic system comprising 26 power stations in stages, ten of which had already been built.

Low-Head Stations

M. Marcel Mary reviewed new developments in low-head power station projects (14). A great deal of research had been devoted, he said, to achieving savings in the construction of low-head stations. Normally such stations utilized vertical shaft generating sets coupled to propeller type Kaplan wheels. The different elements entering into the new developments were mainly as follows: firstly, the adoption of buttress or pillar station layouts. In this arrangement instead of grouping all the sets into one building situated at one end of the dam they were placed in the buttresses of the spillways. The machines were of outdoor or semi-outdoor construction. Secondly, the elimination of spiral intakes in vertical shaft turbines: it had been found quite easy to obtain an even distribution of the water simply by placing a few concrete profiles at the intake together with fixed directing elements. The wheel was then provided with adjustable blades and isolating gates should be provided for safety at the outlet of the venturi. A third element in development was the utilization of horizontal shaft turbines with axial flow. These were by now fairly well known and did not have a spiral intake. It was better to have a propeller wheel with adjustable guide vanes rather than a Kaplan wheel which entailed complication in the civil engineering work. One solution in some cases was to provide a number of propeller sets one only of the total being a Kaplan wheel. The fourth development was the use of submerged alternators which were known as "bulb" alternators. This type of plant consisted of a closed metallic shell in the stream of water diverted for the turbine, inside which the

alternator was placed. The use of over-drive gears was another useful development as it was advantageous to reduce the size of the machine by increasing the speed of the alternator above that of the turbine.

The author concluded that it was already possible to state that the application of some of these methods had permitted the economic development of sites which the conventional hydro station had up to now rendered too costly.

INTER-STATE TRANSMISSION

In an account of the work of the International Interconnections Study Committee, Prof. G. Silva (15) pointed out that, although the exchange of electrical energy between European countries amounted in 1954 to only a little over 3 per cent of the 190,000 million kWh produced, the value of interconnection was inestimable. For example, Switzerland during a shortage of stored water in the winter of 1953-54 had been enabled to maintain normal supplies to its consumers by making up the deficiency from the common pool. The other countries concerned were Western Germany, Austria, Belgium, France, Italy and Holland.

Regulation of frequency and power transfer between countries was referred to (16) by Mr. F. Cahen as the most important technical problem arising from the parallel operation of two or more national transmission systems. The present state of interconnection (by " circumferential welding ") and regulation in each of thirteen countries, for both internal and exchange purposes, if any, were described and projects for the future foreshadowed. The tendency was towards a more general linking up of networks across national frontiers at 150 and 225 kV pending operation at 380 kV.

In Western Europe most countries were equipped or were being equipped with automatic regulation for their own requirements, which was being planned for adaptation to the power-frequency method for international interconnection as recommended by the Study Committee. Assuming a power-frequency characteristic of 2 per cent per 0·1 c/s (cf. 3·5 per cent in Great Britain and 1·5 per cent in France) a disturbance of 100 MW on the interconnected systems would vary the frequency by only 0·014 c/s. To lower the frequency from 50·1 to 49·9 c/s an increase in transfer of 1,400 MW would be necessary. With adequate interconnecting lines $\pm 0{\cdot}1$ c/s could be maintained during power transfers without either manual or automatic regulation or alteration to the setting of turbine governors. For a load variation of 100 MW on the French system only 15 MW would be provided by French stations, the remainder being imported. In order to suppress transfers rapidly for commercial reasons, however, power-frequency regulation would be applied at all frontiers with suitable values of regulation energy. The conclusion was reached that progressive extension of interconnected operation in Western Europe should improve the present regulation of separated systems without complicating their operation. Tests for predetermining power fluctuations and the heating of a 132 kV cable between England and France were described. A telephone line, connected between the two national control centres, transmitted by telemeter the frequencies of one country to the other.

These tests demonstrated the practicability of operating the two systems in parallel when joined by a single 132 kV cable of 200 MVA nominal capacity. It would entail close regulation of frequency and power transfers, carried out in both countries with a mixed power-frequency characteristic. Automatic regulation would have to be installed in Great Britain (as now in France), which would otherwise have not been required until possibly 1960. With the present manual control the standard frequency deviation was 0·064 c/s, and $\pm 0{\cdot}1$ per cent for 90 per cent of the time.

The capacity available in each system for automatic regulation should always be enough to meet the extremes of load variation so as to avoid large departures from the transfer programme, which determined the margin required between the nominal cable heating permissible and the maximum transfer. Rapid fluctuations of moderate amplitude of the power transmitted hardly influenced the heating of the cable.

COAL AND ELECTRICITY TRANSMISSION

An economic comparison (17) between the transport of coal and the transmission of electricity was made by R. Conrad with two objects. The first was to reveal the essential factors which had led several countries to appreci-

Some of the delegates attending the UNIPEDE Congress in London

ably different conclusions regarding the relative advantages of the two and to indicate the best sites for thermal stations in this respect.

The second aim was to find the best theoretical distribution of thermal generating capacity between a coalfield and a load centre 200 km away, assuming existing generating plant and an energy consuming area to be situated at the mines, and also to ascertain the optimum capacity of the electrical system interconnecting the two areas.

Coal Quality and Freight Charges

Conditions in different countries diverged sufficiently to account for conflicting views, mainly on account of variations in cost of coal transport, capital charges of the electrical system and calorific value of coal. In general coal of less than 4,000 kcal/kg (7,200 B.Th.U./lb) should not be transported; for coals of better quality, the decision depended mainly on cost of transport and interest rates appertaining to each country.

Where freight charges were moderate and interest charges were high there was often nothing to be gained by transmitting electricity from a mining area and power stations there would supply only local needs. Where electrical transmission was justified a portion of the total generating capacity could always be advantageously sited at the load centre and, when coal transport was costly, used to meet peak demands only. It might also pay to construct a transmission system between a load centre at the coalfield and another elsewhere with a power station at each having enough generating capacity to meet its own maximum demand, surplus and off-peak energy being normally taken from the coalfields.

In France transmission at 225 kV was less economical than transport of good quality coal; somewhat similar results were obtained in Belgium with a difference due to an interconnecting voltage there of 150 kV. In Britain low interest rates, moderate costs per B.Th.U. at the pithead and relatively high rail tariffs favoured electrical transmission, the case for which would be strengthened by the use of 275 kV.

DISTRIBUTION

The voltage trend in distribution systems was then discussed by P. Gaussens (18) who gave the result obtained by the UNIPEDE Distribution Study Committee. This Committee had paid special attention since its inception to the study of the quality of service in medium and low voltage systems. Since this quality of service depended on a fairly large number of parameters it was not possible to make an extensive examination of them. However, the author showed the possibility of applying a very definite criterion for expressing generally the quality of the voltage in a distribution system; this criterion had been termed the overall irregularity of the voltage in the system. There were also two supplementary criteria, the reduced mean deviation and the reduced typical deviation, which gave useful indications of the nature of this irregularity independently of the voltage in relation to the nominal voltage and in fluctuations of the voltage about its mean value.

Since it was possible to determine the value of these criteria by calculation it was an easy matter to compare the effectiveness and the economic value of the different means available for improving the quality of the voltage in distribution systems. For example, the reinforcement of existing lines, the constructing of new lines, or of new m.v./l.v. transformer stations, or the installation of stepped voltage regulators, of shunt capacitors for m.v. and l.v., or of series capacitors.

TARIFFS

The report which was presented on behalf of the tariffs committee by Gabriel Desuss (19) consisted of an introduction reviewing the work of this committee during the last three years and three sections dealing with tariff discrimination, investment charges, and tariff investigations at present being carried out. The report indicated that despite its statistically simple appearance the price of electricity was made up of a number of figures of which the costs, however specific, did not appear to occupy such an important position as would appear from *a priori* reasoning.

The complicated and sometimes anarchic character of the results obtained confirmed the multiplicity of factors which intervened in the establishment of the price of electricity. It was not possible to establish the most elementary figures which a tariff structure, based mainly on costs, should reveal. The report indicated that hydro-electric regions did not seem to recognize any systematically greater tariff reductions than thermal regions, and that prices charged in country areas were very often the same or lower than those in towns. A mere knowledge of the price difference did not enable tariff laws to be revealed at all, because the incidence of generation, transmission and distribution costs could not be determined except through the veils of the fiscal system and economic and social policies. No doubt these differences resulted from a combination, both very complicated and infinitely variable according to country and types of supplies, of the numerous causes of diversity enumerated in the report. The absence of information on the cause of the disparities observed necessitated great care being exercised in the comparison of price ranges.

The Working Group on the trinomial apportionment of costs, the report of which was presented by Marcel Dulait (20), was set up by the Study Committee on Tariffs with the object of trying to put at the disposal of those who wished to make comparisons, either complete or partial, between the costs of electricity, a *vade mecum* which would serve them as a guide in taking into consideration all the costs involved, and at the same time in classifying these costs logically, in accordance with the pre-conceived plan. Apart from any question of comparison the investigation should also facilitate the task of those wishing to work out tariffs based on the concept of marginalism.

By "trinomial apportionment of costs," should be understood the allocation of all charges of whatever nature (capital, maintenance, operation, sundry charges) which were incurred at the various stages of generation, transmission, distribution and the sale of electrical energy, between the three main classes of costs, i.e., demand-related, energy-related and consumer-related (costs of power, costs of energy, and costs for the consumer). In an attempt to achieve the aims set before it the Working Group had drawn up a table of cost items which listed in accordance with a logical plan all the kinds of charges which were encountered in operation. This table, which was reproduced in detail in the report, included the designations kW, kWh, consumer, in preparation for the trinomial apportionment, but at the present stage these were merely suggestions resulting from the first examination by the Committee.

OPTIMUM UTILIZATION

A general report on the activities of the Study Committee for this subject was given by E. Tiberghien (21). He explained that this committee had started by examining some of the domestic applications of electricity particularly lighting, electric cooking and electric water heating.

The progress in the consumption of electrical energy even in the most advanced country showed no sign of easing; obviously a limit did exist although it was capable of receding as a function of technical progress.

The development of domestic applications of electricity from 1950 to 1953 was described in great detail by E. Tiberghien and J. De Felice (22). In this report the authors collated a great deal of statistical information relative to domestic electrical usage in many countries of Europe. It was interesting to note from the first table that the percentage of the population whose homes were supplied with electricity placed six countries ahead of Great Britain in the list, with 94 per cent. A very detailed analysis was made of the total consumption for different purposes, for different appliances, for different classes of consumers and for the types of apparatus owned by the different types of consumers in various countries relative to their standard of living, etc. Figures of consumption were also analysed relative to the type of tariff; the average for consumers on a flat rate tariff was very much less than that of consumers on a graded tariff, the variation being of the order of 2:1. One of the tables showed that Great Britain was among the leaders in the use of electric cookers with 21·7 per 100 consumers. Two countries exceeded this amount, Sweden with 30 per 100 consumers and Switzerland with 43·8 per 100 consumers.

From their general analysis the authors thought that in the majority of countries the most rapidly developing appliance in terms of utilization was the washing machine followed closely by the refrigerator, then the water heater and finally the electric cooker.

Taxes on Domestic Appliances

A final section dealt with the taxes imposed on domestic electrical appliances in the various countries of Europe from which it would appear that Great Britain with tax rates from 25 to 50 per cent had easily the highest.

Another paper by MM. De Felice and Tiberghien (23) dealt with the organization and operation of the domestic electrical appliance market throughout Europe. The conclusions to be drawn from this report seemed to be that there was a growing expansion in many countries, especially in large centres, of manufacturers' agencies providing direct sale to the customer of appliances of a certain value. The part of the wholesaler appeared, at least in some countries, to be tending to diminish. Considerable emphasis was placed on the importance of a supplier of domestic equipment having sufficient knowledge of the equipment and suitable conditions for providing running maintenance and repair. Reports from several countries emphasized that electrical contractors and retailers who had service organizations were rare. As a result of costly repairs and long delays in work, dissatisfied customers sometimes turned to other forms of energy where better after-sales service was provided. It seemed that supply authorities on the whole gave better service than small contractors in the way of servicing.

Another paper (24) by the same two authors discussed credit-trading policy as applied to electrical apparatus on domestic premises. It appeared that the types of credit sale known in this country, for instance deferred payments, hire purchase and simple hire, were fairly general and widespread throughout the countries of Europe with the exception of Sweden where such a policy was considered unnecessary due to the high standard of living of consumers in that country.

A paper by M. De Felice alone (25) studied the relationships between the standard of living and domestic consumption of electricity. In this an attempt was made to establish a general level of consumer expenditure in the various countries and to examine this relative to the domestic consumption of electrical energy. One tendency that could be observed was that the consumption of electricity was more than proportionate to the standard of living of the population; the higher the standard of living of the inhabitants the greater was the rate of increase of their consumption with the rise in their standards.

Electric Cooking in Switzerland

Dott. Ing. di Miglione presented a report upon the development of electric lighting in Italy (26), and J. Blankart dealt with the application of electricity to the cooking of food in Swiss households (27). After examining the reasons for the relatively high number of electric cookers in use in Switzerland, the author provided a great deal of data relative to their use quoting an average consumption per cooker of 1,390 kWh per annum. About 50,000 new electric cookers were being installed annually. A second part of the report covered the advantages and disadvantages of electric cooking from the user's point of view and compared these with the alternative forms of energy available. It was felt that the electric cooker fulfilled most of the characteristics which could reasonably be insisted upon in apparatus designed for cooking food with the exception that progress still had to be made in the matter of ease of regulation and the actual speed of cooking. Plate elements of 2,500 W rating were now being made, this being a considerable advance over the present standard of 1,800 W for a large plate. This progress enabled the time necessary for bringing water to the boil to be reduced by approximately 45 per cent. The majority of new cooker plates had a stainless steel rim, permitting easier maintenance and eliminating the nuisance caused by the oxidation of the rim.

A specialized report on domestic water heating by electricity in the Federal Republic of Germany was presented by Dr.-Ing. Kurt Halbach (28) and this was followed by a paper from Mr. E. A. Fowler (29) describing the commercial organization of Area Boards in Great Britain. This paper reviewed broadly the commercial functions and organization of the Boards and explained briefly the factors which had contributed to the development of their policy since 1948. He described their commercial and promotional activities in some detail and said that the Area Boards realized that they must frame their future policy around the development of off-peak utilization, combined with a more intensive sales programme particularly for appliances with good demand characteristics.

Electricity in Industry

The last report in this section was by MM. De Felice and Tiberghien and dealt with the level of utilization of electrical energy in industry (30). This report aimed at determining and comparing the level of utilization of electrical energy in industry in those countries which had participated in the work of the Study Committee. It was felt that an investigation of the relationships between industrial production and industrial consumption of electricity was very important to distributors. An attempt was made to establish the consumption of electrical energy as a function of industrial production and of the utilization of manual labour. Tables were included giving assessments of the consumption of electricity in different industries in the various countries considered. An interesting point noted in one of the many tables was that the kWh consumed per dollar produced in the main branches of industry during the period 1950-53 was 2·0 for Great Britain as against, to quote some of the figures, 3·1 for France, 2·85 for Belgium and 3·75 for Western Germany, taken over the whole range of extractive and manufacturing industries.

STATISTICAL METHODS

Introducing the papers presented under the auspices of the Statistics Study Committee, Dr. W. L. Froelich (31) alluded to the increasingly important role of statistics in the operation of electricity undertakings. This role was the collation of data, analysis of the relationship of grouped data and their use for forecasting future developments. Correct interpretation and knowledge of the degree of accuracy of the information thus supplied were essential. Matters for statistical study were becoming more numerous, varied and more detailed, and more complex because comprising more elements of diversity with expanding consumption.

The rate of growth of load was one of the primary preoccupations of operators. Its development in time was the load curve, but this revealed nothing of its fundamental structure or its component elements which were required for the forecasting of load and its influence on networks extensions. Methods used hitherto were mostly empirical and were in many cases no longer adequate. The trend towards single-meter tariffs made it more difficult to separate the load into constituent elements.

As an illustration of the practical value of statistical methods Dr. Froelich mentioned a recent contribution to the *Proceedings* of the Institution of Electrical Engineers by Mr. R. B. Rowson. In this it was stated that the risk of shut-down of a network fed by one transformer and one feeder fell to one-tenth when a second transformer and feeder were connected in parallel. Another example was the procedure adopted by the Central Electricity Authority for forecasting load with variations in the weather.

A report on the investigation of load curves and diversity factors (32) was presented by Mr. R. Y. Sanders, chairman of an *ad hoc* working party appointed by the committee. Growth of system load, he pointed out, was dependent much less on mains extensions and subsequent connection of new consumers than on the efforts of the supply industry and appliance retailers to secure installation of additional equipment by existing consumers. After a survey of the purposes for which analyses were desirable, e.g. the planning of systems, plant installation and plant overhaul programmes and the framing of tariff policy, the author discussed the data and instruments required and methods of employing them. He indicated the need to separate systematic from erratic variations in load.

Far more records were required of the relationship between demands at various levels of distribution, and these had to be secured without inconveniencing consumers. In Great Britain 100 houses were being supplied from one substation through three metered circuits—cooking, water-heating and lighting with miscellaneous power. Telecontrol systems were used by many undertakings for remote control of two-rate meters for time-of-day tariffs or of water heaters. The most promising way of deducing the contributions made to total system load curves by several main types of consumers was multiple regression analysis. This method depended upon the selection of load curves from a number of parts of a system (or from separate systems) serving different proportions of the principal types of consumers or consumers of one type equipped with the main types of apparatus in differing proportions.

The influence of weather in the Paris region (the peak load of which was one-fifth of that of all France) was discussed by Mr. E. Vedere (33), who showed that load variations at peak due solely to temperature were about 20 per cent. Taking into account estimated annual load growth, the possibility of such a peak during the coming year could be forecast by eliminating uncertainty as a result of abnormal conditions in the preceding winter.

Effects of temperature, cloud and daylight on the system load in the Hamburg district furnished the theme of a paper by Mr. H. H. Nissen (34), who showed that the daily maximum demand did not indicate the requisite relationships. Its value had to be corrected for seasonal influences, the special characteristics of the daily load and the load development independently of the weather. The use of the regression formula enabled the demand to be forecast within 2 and 3 per cent.

Through a successive elimination of the long-term trend due to increase of population; of the seasonal trend, other than that caused by seasonal variation; and of weekly variations, Messrs. W. J. A. Kuipers and A. W. Zuidweg (35) deduced the incidence of temperature and cloud by means of a multiple-regression calculation. The residual load appeared to follow a normal distribution. The effect of temperature on consumption of electricity was dealt with by Mr. L. Perrin (36), who by eliminating the causes of adventitious seasonal variations obtained a trend of development freed from the incidence of diurnal lighting.

Sampling as a means of acceptance testing of equipment commonly purchased by electricity supply undertakings provided the subject of a paper by Dr. E. Pautrie and Dr. A. Smid (37), with especial reference to insulators for 1,000 V and less. Another document on sampling by modern statistical methods, which brought together essential published data on control of manufacture and acceptance of plant was presented by the Giunta Technia, Edison Group (38). A further example of the application of statistical distributions (39), submitted by Messrs. W. Pfahler and Ch. Morel, was the effect of a group of 17 washing machines on the network load between 7.30 and 8 a.m. (the peak on the network concerned); at that time the probability was that the load would never exceed that of six machines. The calculated decrease in washing machine demand in relation to the number of machines was tabulated.

The same Study Group was responsible (40) for the preparation of recommendations for international nomenclature of terms employed in statistics. These were classified as hydraulic generation, thermal generation, transmission lines and consumers.

PROTECTION OF TELECOMMUNICATIONS

The report presented by Maurice Paimboeuf (41) showed the results achieved by the representatives of UNIPEDE co-operating in the work of the Commission of the CCIF charged with the establishment of recommendations concerning the problems raised by the existence of power and telecommunication lines. The most important problem at present was that of the limit laid down for the longitudinally induced e.m.f. into telecommunication lines in the event of a fault on a power line. The low value of this limit (fixed until now at 430 V in every case) often caused considerable increases in route lengths in the case of new projects, or very heavy expenses on the telecommunications line (providing underground cables) in the case of an increase of voltage on the existing power lines. These restrictions could lead to heavy expenditure by the power supply enterprises.

The report brought out two main points, one being the raising to 650 V of the permissible voltage in the case of high grade security of service line, and the other the publication of different special means of protection capable of being used on telecommunication lines. Until now the telephone administrations when considering these prob-

lems only took into account the maximum value of induced voltage likely to be reached in the most unfavourable case. These administrations had now admitted the importance of the conception of probability and took this into account when carrying out studies.

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Chairman: G. R. Peterson (Great Britain)

1. "General Report of the Committee." G. R. Peterson.
2. "Combined Coal-Oil Fired Stations." R. Boudrant (France).
3. "Use of Thermal Power Station Ash." G. Van Antro (Belgium).
4. "Experience with the Use of Slag-Tap Methods of Firing." Dr. L. Spennemann (Germany).
5. "Atmospheric Pollution Arising from Power Station Operation." Dr. H. E. Crossley and G. R. Peterson (Great Britain).
6. "Power Stations and the Effluent Problem." G. R. Peterson and F. F. Ross (Great Britain).
7. "Starting of Boilers and Turbo-Alternator Sets." J. Ricard (France).

HYDRO-ELECTRIC GENERATION STUDY COMMITTEE

Chairman: Dr. C. Marcello (Italy)

8. "Study of the Part that Hydro-electric Power will Come to Play in the Future Load Curve, due to the Progressive Exhaustion of Hydro-Electric Resources." C. Aeschimann (Switzerland).
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10. "Evolution in Dam Construction and its Effects on Cost and Quality of Energy." Dr. C. Marcello.
11. "Nature and Method of Operation of Steam Power Stations used for Equalizing Water Power." G. Bardon (France).
12. "The Present Position of the Investigations and Results on the Forecasting of Run-off and Hydraulic Productibility at Electricité de France." S. Ferry (France).
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18. "The Voltage Trend in Distribution Systems." P. Gaussens (France).

TARIFFS STUDY COMMITTEE

Chairman: C. Aeschimann (Switzerland)

19. "Current Problems concerning Electricity Tariffs." G. Dessus (France).
20. "General Report of the Working Group on Trinomial Apportionment of Costs." M. Dulait (Belgium).

OPTIMUM UTILIZATION OF ELECTRICAL ENERGY STUDY COMMITTEE

Chairman: E. Tiberghien (Belgium)

21. "General Report of the Chairman of the Committee." E. Tiberghien.
22. "General Report on the Development of Domestic Applications of Electricity from 1950 to 1953." J. de Felice (France) and E. Tiberghien.
23. "Organization and Operation of the Domestic Electric Appliance Market." J. de Felice and E. Tiberghien.
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25. "General Report on the Study of Relationships between Standard of Living and Domestic Consumption of Electricity." J. de Felice.
26. "The Development of Electric Lighting in Italy." Dr. M. Rodino di Miglione (Italy).
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Chairman: Dr. W. L. Froelich (Switzerland)

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40. "Definition of Terms used in Electricity Statistics: General Report of the Working Group on Nomenclature."

PROTECTION OF TELECOMMUNICATIONS STUDY COMMITTEE

Chairman: G. Jancke (Sweden)

41. "Co-operation between the International Union of Producers and Distributors of Electrical Energy with the International Consultative Committee for Telephones." M. Paimboeuf (France).

Protection of Cable-Sheathing

A SYMPOSIUM on the Protection of Cable-Sheathing against Corrosion is being arranged by the Corrosion Group of the Society of Chemical Industry to take place on 18th November next at the Institution of Electrical Engineers, Savoy Place, London, W.C.2.

Five papers will be presented and discussed as follows:—"The 'Phenol Corrosion' of Lead," by R. L. Davies and E. L. Coles (British Insulated Callender's Cables, Ltd.); "Cathodic Protection of Telecommunications Cables," by J. Gerrard and J. R. Walters (G.P.O.); "The Protection of Buried Power Cables," by J. H. Gosden (Central Electricity Authority); "The Behaviour of Aluminium-Sheathed Cables," by P. A. Raine (Johnson & Phillips, Ltd.); and "The Mechanism of Corrosion of Metal Pipes in Soils and Practical Methods of Prevention," by W. W. Robson and A. R. Taylor (Associated Lead Manufacturers).

Further details and forms of registration may be obtained from the Society, 56, Victoria Street, London, S.W.1.

LETTER TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

E.C.A. Specifications

IN YOUR issue of 2nd September Mr. T. C. Gilbert discussed my Association's specifications for electrical installations in small houses at some length. In his article, Mr. Gilbert deplores the fact that no reference is made to p.v.c.- or polythene-insulated cables. I think I should point out that my Association had, and has, no intention of deliberately attempting to standardize on rubber-insulated cables only, to the exclusion of the newer types of insulation. The situation is simply that specifications were prepared for the more conventional types of installation first of all, and the preparation of specifications for installations using cables insulated with various types of synthetic material which require special treatment is now being considered.

So far as the alternative earthing arrangements are concerned, it must be made quite clear that the specifications were prepared primarily for the use of local authorities engaged in the erection of small houses. The requirements, therefore, are minimum requirements.

London, W.C.1. L. C. PENWILL,
Director and Secretary,
Electrical Contractors' Association.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Mr. V. A. Pask, C.B.E., M.I.E.E., M.I.Mech.E., chief engineer of the Central Electricity Authority, is retiring in December after forty-five years in the electricity supply industry. Mr. Pask was born in Manchester and after education at the Preston Technical College gained his early training in the tramway and electricity undertakings of the Preston Corporation. He subsequently held positions with the Paisley, Hull and Bootle Corporations and in 1920 became deputy general manager and engineer of the Newcastle & District Electric Lighting Co., Ltd. After holding this post for twelve years Mr. Pask was appointed city electrical engineer of Norwich and was responsible for much pioneering work in rural electrification over a large part of Norfolk. At the beginning of 1940 he was invited to join the staff of the Central Electricity Board as manager of the Mid-East England Area and three years later also took over the management of the North-East England Area. In 1946 he came to London as personal assistant to Sir Johnstone Wright, general manager and later chairman of the Central Electricity Board.

Mr. V. A. Pask

Just before nationalization in November, 1947, he was appointed chief engineer to the new British Electricity Authority and since that date has been responsible for the engineering direction of the largest integrated electric power generation and transmission system in the world. Since vesting day forty-one new power stations have been commissioned and the installed capacity has risen from about 12½ million kW to over 20 million kW. In addition the 275 kV grid has been designed and is now actively in course of construction.

Mr. A. E. Underwood

Mr. A. E. Underwood has been appointed to the main board of the Plessey Co., Ltd. Mr. Underwood joined Plessey from Salford Instruments, Ltd., in 1948. He was appointed an executive director in 1951 and a director of Plessey International, Ltd., last year.

Miss Mary Mitchell, holder of the 11th Caroline Haslett Trust Travelling Exhibition, left London on 11th September on the first stage of her tour of the Low Countries to study different aspects of electrical housecraft. She will be the chief guest at the 20th anniversary dinner of the Dutch Electrical Association for Women in Arnhem on 7th October.

Mr. H. W. Hoover, president of the Hoover organization, returned to the United States on 15th September on the conclusion of a visit to the British organization, Hoover, Ltd.

Mr. R. A. F. Hammond, B.Sc., A.R.C.S., F.R.I.C., has been elected president of the Institute of Metal Finishing for the year 1955-56.

Mr. A. S. Summers, A.M.Inst.F., superintendent at South Shields power station of the North Eastern Division of the Central Electricity Authority, has been appointed superintendent at Darlington power station, with effect from 1st October, in succession to **Mr. C. T. Port,** who retires at the end of this month. Mr. Summers served an apprenticeship with Sir James Laing & Sons, shipbuilders and engineers, and in 1917 became a draughtsman with the North Eastern Marine Engineering Co., Ltd. In 1920 he went to sea as a marine engineer with the British India Steam Navigation Co., Ltd. He joined Sunderland electricity undertaking as a mains assistant in 1924, and was later promoted to shift charge engineer and maintenance engineer. After vesting day he continued at Sunderland power station until his appointment in 1953 as superintendent at South Shields.

Mr. A. S. Summers

Mr. T. E. Wilson, A.M.I.E.E., assistant electric traction engineer, Manchester, has been appointed assistant (electric traction and generation) to the chief mechanical and electrical engineer, British Railways (London Midland Region), Derby. Mr. Wilson began his railway career as an apprentice in the electric car repair shop at Stonebridge Park on the former L.M.S. in 1929. After gaining experience he held positions as draughtsman and tester and was appointed technical assistant at Euston in 1938, being transferred to Derby in July, 1939. In January, 1945, Mr. Wilson was appointed assistant electric traction engineer, Manchester electrified lines, in connection with the electrification of the Manchester-Sheffield-Wath line, the post he now leaves for his new appointment at Derby.

Mr. Kenneth O. Anstead has been appointed export manager of Dimplex, Ltd. During the last five years he has been export manager of Wellworthy, Ltd., Lymington, Hants. He is a member of the Institute of Export and an associate member of the Institute of Shipping and Forwarding agents.

Mr. K. O. Anstead

Mr. R. McCullough has been appointed managing director of Lumenated Ceilings, Ltd., a subsidiary of Thermotank, Ltd. Mr. McCullough has spent the last thirty years in the Middle East and until leaving to take up permanent residence in the United Kingdom, was senior partner in the firm of William Stapleton & Sons in the Suez Canal Zone and a former director of Wills & Co., Ltd. Mr. McCullough remains on the board of Egyptian Aviation and Travel Services.

In our last issue we reported the appointment of **Mr. T. Miller** as London manager of Gent & Co., Ltd., Leicester. Mr. Miller, who has been head of the company's Estimating Department for a number of years, received his technical training at the Leicester Technical School (now the College of Technology) and has been with the company since his early youth. He took up his appointment in London on 20th September.

Mr. T. Miller

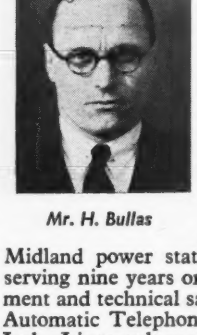
G. & J. Weir, Ltd., announce the appointment of **Mr. A. M. Baxter,** M.Sc., Ph.D., A.M.I.Mech.E., A.M.I.N.A., as head of their Research Department, to take effect from 1st December next. Dr. Baxter, who is at

present the senior lecturer in the department of Civil and Mechanical Engineering, Royal Technical College, Glasgow, served his apprenticeship at Weir's and was awarded the Parsons Scholarship by the Institution of Naval Architects; he graduated B.Sc. with honours in 1936. He was also awarded the A.R.T.C. and Montgomerie Neilsen Prize for a thesis on the recording of torsional oscillations. Dr. Baxter entered Emmanuel College, Cambridge, in 1937 and carried out research in yield point phenomena in steels. During the war he was working with the Admiralty under the Director of Scientific Research, and afterwards joined the British Shipbuilding Research Association. His degree of Ph.D. was awarded by Glasgow University in 1954 for a thesis on tests for a proposed hydro-electric scheme and other fundamental experimental work. Dr. Baxter is a member of the Institute of Engineers and Shipbuilders in Scotland.

Sir George Briggs has resigned from the board of Tube Investments, Ltd., because of increased commitments in industry, and has also relinquished his appointments with the subsidiaries. He will remain available in a consultative capacity.

Mr. M. R. C. Gilling, A.M.I.E.E., has been appointed commercial officer, Central Area (at Stirling), of the South of Scotland Electricity Board. After service with the Cheltenham electricity undertaking and the Midlands Electricity Board, Mr. Gilling became district commercial officer at Weston-super-Mare in 1950. Since 1953 he has been district commercial engineer in the Southern District of the Glasgow Area.

Mr. H. Bullas, Assoc.I.E.E., has been appointed sales manager of the Power Equipment Co., Ltd., operating from the works and offices at Kingsbury, London, N.W.9. Mr. Bullas was educated at the Birmingham Technical College and Birmingham University. He began his career in a Midland power station, subsequently serving nine years on design, development and technical sales work with the Automatic Telephone & Electric Co., Ltd., Liverpool, and ten years with Standard Telephones & Cables, Ltd. (Radio Section), London. For the past five years he has been London manager for Wm. McGeoch & Co., Ltd.



Mr. H. Bullas

Mr. John Huntley, of Harehills, Leeds, a member of the staff of the Yorkshire Electricity Board, has resigned in order to take a course of theological studies at the College of the Resurrection at Mirfield, near Huddersfield, with a view to becoming a clergyman in the Church of England.

Mr. P. G. Ware, A.R.Ae.S., M.S.A.E., has been appointed chief engineer (electrical) by C.A.V., Ltd. Mr. Ware had a naval training and subsequently held appointments with the Bristol Aeroplane Co., the Admiralty Committee set up to investigate motor torpedo boat power plants, and Roy Fedden, Ltd. He joined C.A.V. in 1950 and later became chief experimental engineer, but left the company in 1953 to join Dowty Fuel Systems, Ltd.; in 1954 he was appointed chief designer, Dowty Hydraulic Units, Ltd. In his new post with C.A.V., Ltd., Mr. Ware will be responsible for the technical direction of electrical engineering design and development.

Mr. P. G. Ware

Mr. P. W. Townsend, managing director of the Kempston Electrical Co., Ltd., Kempston, Beds, has decided, following a recent illness, to relinquish some of his activities, and to dispose of his controlling interest in the company.

The Minister of Transport and Civil Aviation, after consultation with the chairman of the British Transport Commission, has reappointed **Sir John Elliot** to be chairman and **Messrs. A. H. Grainger, L. C. Hawkins** and **B. H. Harbour** to be full-time members of the London Transport Executive. **Mr. Anthony Bull** has been appointed a full-time member of the Executive. The Minister has reappointed **Lord Williams** to be a part-time member. **Mr. John Cliff,** deputy chairman of the Executive is to retire at the end of his term of office on 30th September. The full-time appointments are for five years from 1st October, and the part-time for three years from the same date.

Birmid Industries, Ltd., announces the following appointments to the board:—**Mr. J. W. Berry** (joint managing director, Birmingham Aluminium Casting (1903) Co., Ltd.), **Mr. H. Goodwin** (joint managing director, Birmetals, Ltd.) and **Mr. G. A. Rider** (commercial director, Birmingham Aluminium Casting (1903) Co., Ltd.).

OBITUARY

Mr. Howard Evans, A.Met., F.I.M., superintendent of the research laboratory at Birmingham of the Mond Nickel Co., Ltd., died on 11th September. Mr. Evans was born in 1907 and, after studying metallurgy at Sheffield University, where he graduated A.Met. with the award of the Mappin Medal and Premium in 1930, he was employed in the Research Department of the Metropolitan-Vickers Electrical Co., Ltd., Manchester. In 1938 he joined the Development and Research Department of the Mond Nickel Co., Ltd., as research metallurgist in the Birmingham laboratory. He was appointed principal assistant to the superintendent in 1945 and in May, 1954, superintendent of the laboratory. He was elected a Fellow of the Institution of Metallurgists in 1946, and was a member of the Iron and Steel Institute, the Institute of Metals, and other societies; he was president of the Birmingham Metallurgical Society for 1954-55.

Mr. S. A. Millington, for many years, until his retirement last year, director and general manager of J. H. Tucker & Co., Ltd., died on 13th September at the age of sixty-three. Mr. Millington received his technical education at the Central Technical School, Birmingham, and became general manager of J. H. Tucker & Co. in 1938, being appointed a director in the following year. On his retirement he took up residence in Cornwall, but he continued to take an active interest in the affairs of the company.

Alderman H. Cruse.—The death is reported, at the age of sixty-seven, of Alderman Herbert Cruse, who was with the Westinghouse Brake & Signal Co., Ltd., for about fifty years, subsequently becoming general works manager and director.

Mr. William F. Smith, works accountant, after fifty years' service with Johnson & Phillips, Ltd., died at his home at Blackheath, S.E.3, on 14th September. Mr. Smith had been hon. secretary and chairman of the J. & P. Sports Club, chairman of the J. & P. Staff Association and hon. secretary of the Ex-J. & P. Association. A memorial service was held at St. John's Church, Blackheath, on 21st September.

Mr. P. W. Petter.—The death occurred on 15th September at the age of eighty-two of Mr. Percival Waddams Petter, who, with his brother, the late Sir Ernest Petter, founded the firm of Petters, Ltd., which is now merged with the Brush Group, Ltd.

Mr. C. Strafford.—The death occurred on 15th September, at the age of seventy-nine, of Mr. Cecil Strafford, M.I.E.E., a former manager of China Light & Power (1918), Ltd. Mr. Strafford was for many years in the Taikoo Dockyard and joined the China Light & Power Co. in 1921 as resident engineer, becoming manager in 1929, a position he held until 1932.

Lord Inverforth, whose death occurred on 17th September at the age of ninety, was for many years president of Marconi's Wireless Telegraph Co., Ltd., and its associated companies, and also of Cable & Wireless (Holding), Ltd.

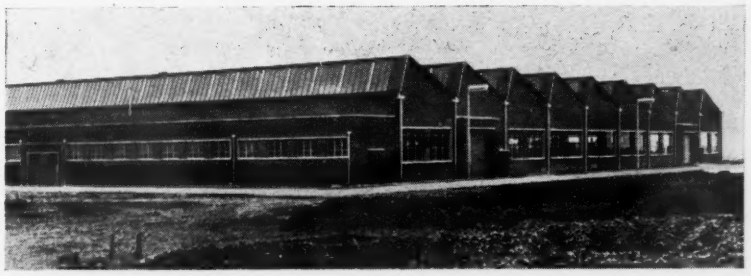
INDUSTRIAL NEWS

Plant for Turkey

The first of three 20,000 kW turbo-generator sets for the extensions to the Catalagzi power station in Turkey was put on commercial load on 15th September. This is part of a £4 million contract awarded to the Metropolitan-Vickers Electrical Export Co., Ltd., and the first generating unit has been put into operation in just over two years from receiving the order. It is expected that the other two units will be commissioned at three-monthly intervals. Catalagzi power station is situated in a coal-mining area of north-west Anatolia on the Black Sea. Metropolitan-Vickers has been responsible as main contractors for the whole of the civil, mechanical, and electrical work (with the exception of the outgoing transmission lines). The principal sub-contractors were Babcock & Wilcox, Ltd., for the boiler plant and auxiliary equipment (to burn pulverized coal from the local coalfield) and Braithwaite & Co. Engineers, Ltd., who have carried out all the civil and building works. The station will eventually contain six 20,000 kW turbo-generator sets and six boilers, the first three having been installed by the Metropolitan-Vickers Electrical Export Co., Ltd., during 1948-49. The electrical output of Catalagzi feeds principally the growing local coal-mining load, where the use of electrical machinery is rapidly progressing, and it also supplies power for transmission to Ankara and Istanbul to supplement the generating capacity in those cities.

B.T.H. Larne Works

The foundation stone of the office block of the new turbine works of the British Thomson-Houston Co., Ltd., at Larne, Co. Antrim, Northern Ireland, will be laid on 29th September by Viscount Brookeborough, Prime Minister of Northern Ireland, who will be introduced by Viscount Chandos, chairman of the B.T.H. Co. At the luncheon which follows the ceremony the principal speakers will be Lord Chandos and Lt.-Col. Lord Glentoran, Minister of Commerce, Northern Ireland. It is proposed, at Larne, to design and manufacture steam turbo-generators ranging from 30,000 kW upwards. Those below 30,000 kW, as well as gas turbines, will continue to be made at Rugby. The Larne works are expected to be completed and in operation by 1957 and the cost of the scheme will be £8,000,000. Initially the company intended only to establish a turbine blading factory at Larne, but with the continued heavy demand for turbines it became obvious that the manufacturing capacity at Rugby could not meet this demand and it was decided to build a new heavy turbine factory alongside the blading factory in Larne, where it is now intended to employ over 3,000 people.



The B.T.H. blading factory at Larne

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 17th September is deemed to be 162s 0d. The "cost of materials" figures are:—

For electrical machinery and equipment the Board of Trade index figure published on 17th September is 188·3.

For turbo-generating and allied plant: Materials used in mechanical engineering industries, 171·4; blast furnaces and iron and steel smelting and rolling (40 and 41), 156·1. The price of ¾in 0/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 16th September) is 4s 8½d per lb. Outstanding contracts covered by the B.O.T. intermediate products index: The index figure for intermediate products (17th September) is 382·3.

Exhibition Poster Competition

We are informed by Mr. P. A. Thorogood, general manager of the Electrical Engineers' (A.S.E.E.) Exhibition, that the following awards have been made in connection with the Exhibition poster competition:—First prize, Mr. N. C. Harding; second prize, Mr. R. C. Turner; third prize, Mr. K. L. Eccles.

Atomic Power Development

Speaking last week at the opening of the West Riding County Council's £200,000 Calder College, Sir John Cockcroft stated that the next five years would witness the construction in the world of at least ten large-scale nuclear power stations of at least five different types. In Britain it was likely that the construction of four large-scale power stations would be completed in that period and twelve in the succeeding five years. By the 1960s much more would be known about the relative advantages and economics and there would then be a firm basis on which to expand this new industry.

This country was very short of technically trained people at all levels, and also short of skilled craftsmen, designers, engineers and scientists. This was felt particularly in new developments such as atomic energy where the need for creative designers was specially acute and the supply very short.

Inquiry into Battery Business

The Board of Trade has referred to the Monopolies and Restrictive Practices Commission the supply of electric batteries. The Commission is to report about both the facts of the matter and their bearing on the public interest. Any person or organization wishing to offer evidence should write to the secretary, Monopolies and Restrictive Practices Commission, 8, Cornwall Terrace, Regent's Park, London, N.W.1.

Airport Service Station Lighting

On page 557 of last week's issue there was an illustration of lighting at the Nutt's Corner Airport Service Station, Belfast, by Philips Electrical, Ltd. The caption indicated that this was a picture of the car showroom; it was, in fact, a photograph of the station office.

The Bakers' Exhibition

"Electricity for Efficiency and Cleanliness" will be the theme of the exhibit of the Electrical Development Association at the Bakers' Exhibition to be held at Olympia from 1st to 6th October. The greater part of the stand will represent an electrically-equipped pastrycook's establishment of moderate size, the electrical appliances including a Hobart pastry roller and 30-quart mixer, a Record bread slicing machine, a Nielson chocolate enrober, a Pelkman Morton bun roll moulder, a G.E.C. scone plate, double-deck oven and doughnut fryer, a United Yeast prover, and a Jackson 3-tier pastry oven. A separate display will include a Pelkman Morton 1-sack

dough mixer, an Ayres Jones automatic mixer, a Creda 100-gallon water heater, a Frigidaire 15 cu ft refrigerator, an Errington chocolate dipping pan, and a Hobart 12½ quart mixer. Enlarged photographs of a typical electrically-equipped bakery and a number of showcards will stress the many advantages of using electricity.

New Telephone Exchange for Malta

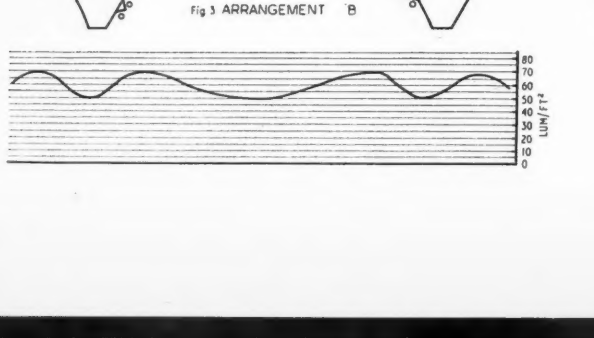
The Government of Malta has entrusted the introduction of automatic telephone switching equipment on the islands to Standard Telephones & Cables, Ltd., who have recently secured the contract for the provision of a new automatic telephone exchange to be known as "Central" in Valletta, the capital of Malta. The work involves the manufacture and installation in a new two-storey building of some 4,300 lines of automatic switching plant, together with a 6-position manual board, power plant, and all subsidiary equipment. Special features will be incorporated in the design of the equipment, to enable a fully flexible system to cater rapidly and efficiently for the special requirements of the islands, including equipment to enable calls to be dialled to other exchanges on the islands. The rather unusual climatic conditions existing in Malta necessitate the installation of a special air-conditioning plant to reduce the humidity and temperature of the air in the exchange building.

Consulting Engineers' List

The Association of Consulting Engineers, 36, Victoria Street, London, S.W.1, has published its 1955 list of members. This includes the names of the Council and officers, a list of engineering subjects, list of members and firms, non-practising members, and a geographical list (by firms). Copies are available from the Association, price (post free) 1s 6d to members and 2s to non-members.

Industrial Lighting

We regret that one of the drawings illustrating the article on "Industrial Lighting," by Mr. R. R. Holmes (Crompton Parkinson, Ltd.), in our last issue was incorrectly reproduced. The amended diagram accompanies this note; in the incorrect one the twin tubes in the curve of the roof were omitted.



Amended drawing of Arrangement "B" in tests carried out by Bally's Shoe Factories (Norwich), Ltd.

Mazda Trade Mark Competition

The British Thomson-Houston Co., Ltd., announces a large-scale Mazda advertising campaign commencing this week inviting the public to choose a new version of the familiar Mazda "Dancing Girl" trade mark. Miss Sonya Raven, the dancer, has been chosen as the Mazda trade mark girl. Seven photographs have been taken of her in classical ballet poses and a competition is open to the public to place them in order of merit, the photograph chosen by the competitor as the best, to be the future Mazda trade mark. Over £3,000 in prizes is offered and there will be bonuses totalling a further £3,000 for the dealers whose names appear on successful competitors' entrance forms. To be valid every entrance form must give the name and address of a dealer. To enable the judges to decide between two or more competitors who may place the pictures in the order chosen by the panel, competitors must write in twenty-five words why they choose Mazda lamps. The rating platform from the lamp carton must be enclosed with each form. The panel will consist of Miss Beryl Grey, the ballerina, Miss Ruth Drew (B.B.C.) and Miss Phyllis Garbutt (Good Housekeeping Institute). A dealer's broadsheet illustrates the series of displays, entrance form dispenser and window pelmet available. The closing date of the competition is 16th December next.

Competition for Young Farmers

Men and women from Young Farmers' Clubs all over the West Country will be taking part in a competition which has been organized by the South Western Electricity Board as a sequel to the successful Young Farmers' Clubs competition held last year. Teams from Young Farmers' Clubs throughout the area covered by the Board will be eligible to enter the competition, the closing date for notification of entries being 15th October.

The competing teams will be given a plan of an old and ill-equipped farmhouse which, by thoughtful planning and wise purchasing, can be converted into a comfortable labour-saving home. Marks will be given for the best selection of equipment and the order of priority in which appliances are installed. Competitors will be asked to prepare a statement of the installation costs, together with an estimate of the running costs of the new appliances in comparison with the old-fashioned methods replaced by electricity. Special tasks for girl competitors will be to plan and work out the cost of providing meals for a threshing party of twelve. To help them in the competition, team members will be able to attend lectures and demonstrations on the wise use of electricity in the home.

Mobile Exhibition

A new mobile exhibition designed and constructed for Hoover, Ltd., will supplement the work of the company's existing mobile exhibition which for a number of years has been a familiar sight at many agricultural shows throughout Great Britain. Unlike the existing exhibition, the new one will tour in the winter as well, showing Hoover products in isolated rural communities and on new housing estates. The whole of the exhibition is wired for 110 V, transformed from the mains supply. There is a water storage tank in the trailer's chassis, water heaters and concealed taps and drainage for use in demonstrating the washing machines.

Cleaner Salesmen as "Pedlars"

The clerk to the Bradford City Magistrates has been informed that an intended High Court appeal against the magistrates' decision in a case involving the 1871 Pedlars Act has been withdrawn. The case concerned four vacuum cleaner salesmen, who were alleged to have acted as pedlars without certificates in going from house to house in Bradford streets. They were each fined 5s by the Bradford magistrates on 6th May. The intended appeal was to have been on the magistrates' interpretation of the 1871 Act.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £171 0s 0d
COPPER, H.C. Electro	ton £374 5s 0d
Fire Refined 99·70%	ton £373 0s 0d
Fire Refined 99·50%	ton £372 0s 0d
COPPER Tubes ..	lb 3s 7½d
Sheet	ton £449 0s 0d
H.C. wire and strip ..	ton £426 10s 0d
LEAD, English ..	ton £107 10s 0d
Foreign	ton £106 0s 0d
MERCURY	flask £95 0s 0d
TIN, block (English) ..	ton £751 5s 0d
ZINC, G.O.B. Foreign	ton £91 15s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 2s 10½d
Sheet	ton £349 5s 0d
Wire	lb 3s 5½d
PHOSPHOR BRONZE Wire	lb 5s 2½d
PLATINUM	oz £29 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 43d—43½d

Mining Locomotives for East Africa

Two battery-trolley type mining locomotives have been built by the Clayton Equipment Co., Ltd., for a gold mine in Tanganyika. They are intended for 24in track, have a service weight of 6 tons, a maximum draw bar pull of 3,000 lb at the one-hour rate and an average speed, under normal haulage conditions, of 6 m.p.h. They are equipped with Exide-Ironclad batteries of 96 cells with a capacity of 210 Ah at the five-hour rate. Rechargeable from the trolley wire current, the batteries incorporate tubular positive plates and "Porvic" separators.

London Design Centre

The Council of Industrial Design is opening a Design Centre in April next year at 28, Haymarket, London, S.W.1, which will be a permanent but constantly changing exhibition of well-designed British goods. All goods displayed will be selected from "Design Review," the Council's photographic and sample record. The estimated annual running cost of the Centre is £80,000, half of which will be provided by the Government and the other half by those firms whose goods are exhibited.

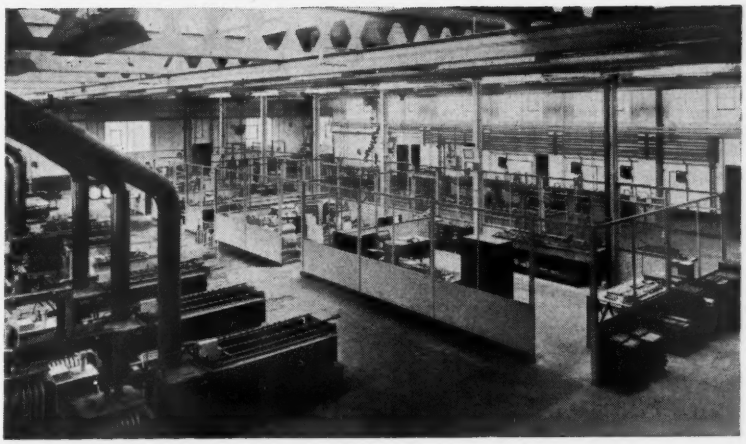
At a Press conference held on 12th September to launch the Design Centre prospectus Mr. W. J. Worboys, chairman of the Council, in explaining the reasons for establishing the Centre, emphasized that it would be complementary to and not in competition with existing trade exhibitions, and it would not compete with the retail trade.

Companies from many industries, including some thirty well-known electrical manufacturers, have already indicated that they will provide exhibits.

"Atlas" Lamp Publicity

Electrical retailers (35,000 of them) have recently received a series of three anonymous cards emphasizing the vastness of the market for electric lamps. It is now revealed (to use the common expression) that the cards emanated from Thorn Electrical Industries, Ltd., as part of the company's autumn lamp campaign. A fourth communication takes the form of a brochure outlining an advertising scheme for "Atlas" lamps and tubes —posters, Press advertising and point-of-sale displays. Mention is made of an "incentive scheme," details of which can be obtained by dealers from the company. One of the items available to retailers is the display stand illustrated.

"Atlas" lamp display stand for dealers' use



Interior of the new Huddersfield factory of Fescol, Ltd. The chromium deposition tanks and associated transformers can be seen on the left

New Fescol Factory

Known as Springbank Works, a new factory built for Fescol, Ltd., for the electro-deposition of metals was opened by the Mayor of Huddersfield at Leeds Road, Huddersfield, on 13th September. It has a two-storey frontage, comprising offices, laboratories, etc., and the main works at the rear covers an area of over 10,000 sq ft, including a chromium depositing shop, nickel depositing shop, stores and inspection departments.

Six vats for chromium deposition are installed in special pits to give a common working height. Above them is a one-ton electric hoist block and several smaller hoists. The chromium shop can deal with shafts of up to 8ft in length, although 4ft 6in is the maximum length which can be treated in one operation. Each vat can deal with a superficial area of about 6 sq ft at one time.

Power is supplied to each vat by an independent oil-immersed "Westalite" rectifier set: five sets each have an output of 1,500 A at 12 V and one has an output of 1,000 A at 12 V. Each rectifier set is a self-contained unit, with mains and auto-transformers, and control gear. Fumes from the vats are extracted through ducting by high speed fans, and to ensure an adequate replacement supply of fresh air, four louvred inlet vents with sliding fronts are provided in the walls. The vents are positioned so that cool air entering the building has first to pass the transformers and rectifiers adjacent to the vats and so cool them.

Vats for the deposition of nickel are also installed in pits to give the same working height. The main electric hoist block serving these vats is of two-ton capacity and the size of shafts which can be accommodated is the same as in the chromium shop.

The power supply is obtained through motor generator sets having a total output of 3,000 A at 10 V. In case of a power supply failure, accumulators with a capacity of 4,000 A at a 10 hr rate of discharge have been installed.

The Fescol process is a method of applying certain non-ferrous metals—particularly nickel and chromium—to already fabricated metal components, so that the superimposed material becomes an integral part of the component. Adequate adhesion of electro-deposits on light alloys was formerly difficult to obtain, but an improved process has now been developed which enables the company to deposit chromium direct on to all known light alloys so that the deposited metal becomes an integral part of the base metal. The new process has received Ministry of Supply approval for use on aluminium and aluminium alloys used in the construction of aircraft and aircraft equipment. The Fescol process does not rely on an undercoat of a second metal to ensure adhesion.

Canadian Engineers in Britain

Thirty-six Canadian engineering graduates have arrived in the United Kingdom to take up Athlone Fellowships awarded by the British Government, and before dispersing to engineering firms, universities and colleges to begin their studies, the British Council has arranged this week a short "Introduction to Britain" programme in London. The Canadians

will be attached to engineering firms in Farnborough, High Wycombe, Luton, Manchester, Newcastle, Rugby, Wilton and Woolwich, the University of Birmingham, Imperial College, London, and the College of Aeronautics, Cranfield.

Commercial Television

The General Electric Co., Ltd., has booked thirty-six weekday "spots" for the first six months of commercial television. Various domestic products, from "Osram" lamps to refrigerators, will be featured in these spots, which are of varying duration, lasting from 60 seconds to 15 seconds.

The wide range of products to be dealt with has inevitably led to considerable variation in treatment, and the company has evolved three main presentation methods, each suited to a particular group. Radio and television receivers are introduced informally after a brief description of some spectacular and interesting G.E.C. achievement in another field, such as the lighting of the Grand Mosque at Mecca. Household appliances will form the subjects of "documentary" style demonstrations. "Osram" lamps will be the subject of cartoons.

E. K. Cole, Ltd., are the first radio company to use commercial television in this country. The first Ekco "spot" was to be yesterday evening (the opening night), covering "Ekcovision," and featuring in particular the new 21in tube console model TC268. There is to be a weekly series, "Thermovent" electric heating equipment being among the range of products scheduled for presentation.

Aid for the E.I.B.A.

"Northern Lights" (the journal published by the North West, Merseyside and North Wales Division of the C.E.A.), is offering prizes of two guineas and a guinea for letters received from its readers, suggesting the best new ways of raising money for the Electrical Industries Benevolent Association. The prizes will be awarded on the twin bases of novelty and practicability, and are to be given as donations to the E.I.B.A.

The *Evening News* has sent to the Electrical Industries Benevolent Association the sum of £101, which represents the proceeds of the admission fees paid by the people who entered for that newspaper's "Television Variety Contest" at the recent Radio Show.

Willesden Civic Show

The ninth annual civic show which was held in Roundwood Park, Willesden, on 10th and 11th September was opened by Sir John Benstead, C.B.E., vice-chairman of the British Transport Commission. In addition to the Mayor of Willesden, who was joined by several members of the Corporation, no fewer than eight Mayors of neighbouring boroughs attended.

In the Trades Section, the London Electricity Board organized an exhibition of electrical apparatus in a large marquee. Ten manufacturers participated in the exhibition and were allocated their own separate stands for display and demonstration. The emphasis was on electricity in the home and throughout the two days continuous demonstrations were held.

Illumination was provided by the London Electricity Board for the 100,000 sq ft of canvas erected and, in addition, the Board installed the general floodlighting equipment. Some 26,000 people attended the show.

Works Visit

Development, works and supervising electrical engineers from a number of leading companies with works in the Birmingham area made up a party of twenty-seven organized by F. Westerman (Wholesale), Ltd., which visited the British Thomson-Houston Co.'s works at Rugby on 6th September. Electronic equipment was the main subject of the visit which concluded with a tour of the works.

Dust Bags for Vacuum Cleaners

The Commissioners of Customs and Excise have reviewed the liability to purchase tax of replacement dust collecting bags for vacuum cleaners and have decided that these bags are outside the scope of Group 12 of the Tax Schedule and in future will not be chargeable with tax.

Cost Accountants' Summer School

Representatives from six countries have been discussing new methods to aid productivity at the annual residential summer school of the Institute of Cost and Works Accountants held this week at Balliol College, Oxford. The lectures given are as follows:—"An Alternative to Piece Work," by Mr. I. B. Cooke (Hopkinson Electric Co., Ltd.), "Using Costs as an Aid to Control, to Sell and to Formulate Policy," by Mr. H. Smith (Wharton Crane & Hoist Co., Ltd.), "Units of Measurement; Key Factors of Production," by Mr. W. E. Harrison (W. E. Harrison & Co.), and "The Role of the Stock Exchange in the British Economy," by Mr. E. Westropp (*Sunday Express*). The annual summer school dinner is being held to-day (Friday), when the speakers will include Sir George Briggs, director of Tube Investments, Ltd., the Brush Group, Ltd., and Thomas Tilling, Ltd.

Smoke Abatement Conference

The annual conference of the National Smoke Abatement Society will be held at Bournemouth from 28th to 30th September. Papers to be presented will include "The Westminster District Heating Scheme," by Ald. C. P. Russell and Mr. Bryan Donkin; "Whole House Warming," by Dr. W. Davidson; and "Electric Floor Warming, etc," by Mr. J. W. Moule. Local authorities, the Beaver Report and the Government Clean Air Bill will also be discussed.

S.S. Sir John Snell

After preliminary speed trials in ballast at Aberdeen, the steam collier *Sir John Snell*, built by Hall, Russell & Co., Ltd., Aberdeen, to the order of the Central Electricity Authority (managers, Stephenson Clarke, Ltd.), successfully completed loaded trials over the Newbiggin Mile on 6th September. The vessel is the second of three sister ships to be completed at Hall, Russells' for the C.E.A. and is intended for trading to the new Shoreham Harbour and the lower reaches of the Thames. She is a single screw, self-trimming, collier of about 3,700 tons dead weight of 18ft loaded draft.

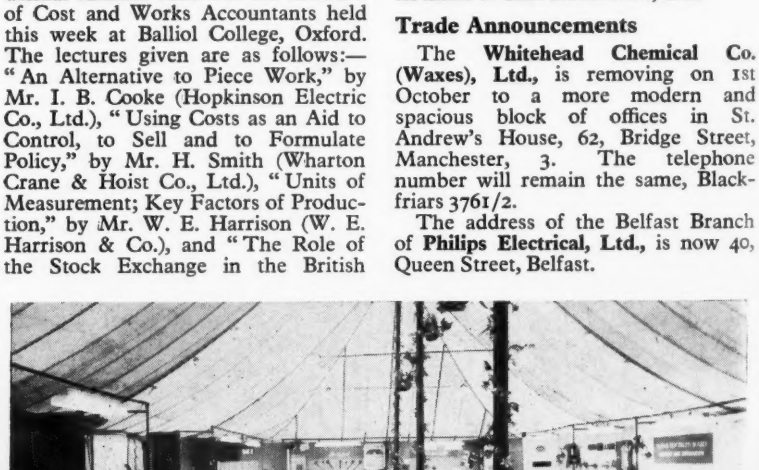
Change of Name

Lincass Electric, Ltd., has changed its name to Cass Electronics, Ltd.

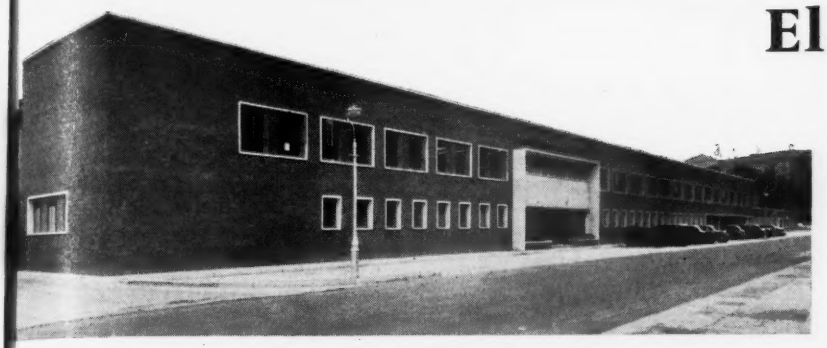
Trade Announcements

The **Whitehead Chemical Co. (Waxes), Ltd.**, is removing on 1st October to a more modern and spacious block of offices in St. Andrew's House, 62, Bridge Street, Manchester, 3. The telephone number will remain the same, Blackfriars 3761/2.

The address of the Belfast Branch of **Philips Electrical, Ltd.**, is now 40, Queen Street, Belfast.



Interior of the L.E.B. marquee at the Willesden Civic Show



Electric Sign Production

Extensions and Processes at Wembley Works

OPPORTUNITY was taken last week during an inspection of extensions at the Wembley works of Claude-General Neon Lights, Ltd., to tour the works and see the various operations involved in the production of electric signs.

First the extensions must be mentioned. These consist of a new frontage building 450ft long and 25ft deep giving on the two floors an additional 18,000 sq ft. The new building accommodates technical offices, a general office and laboratories. The main works was orginally the South African Pavilion of the 1924-25 British Empire Exhibition a fact which is testified to by the foundation stone laid by the late Field Marshal J. C. Smuts and now incorporated in the new entrance hall.

In such a building the lighting is naturally a special feature and one thing about it is what is believed to be the largest continuous strip of fluorescent lighting tubes in any building in Great Britain; it is 300ft long and consists of a series of twenty-eight fittings containing 20 mm "Osram" cold-cathode new warm white tubes.

Apart from a few components, sign production offers little opportunity for mass production; each sign is an individual job calling for individual craftsmanship. The work starts in the drawing office where scale drawings are prepared for each sign showing all the details of its position and fixing methods. Then a full-scale master plan is produced which serves as a template for the men who actually fashion the sign. Construction is in sections which can easily be replaced and records are kept of these. Copies of the scale drawings are sent to all the departments concerned in the manufacture of the sign and a circuit diagram is provided for the erection department.

Tubing for the signs comes from the nearby Osram Glass Works. It is first washed and then internally coated with fluorescent powders (produced by Lumifax, Ltd.—a G.E.C. subsidiary) mixed with nitro-cellulose to form a smooth cream. This is forced upwards through the tubes which are vertically mounted in a revolving "tower" and then allowed to drain downwards leaving a thin uniform coating. The tubes are rotated in the tower and dried and are then taken to a baking machine in which the glass is softened and the nitro-cellulose dispersed.

The principal excercise of skill is in the bending of the tubing. For this purpose the full-scale drawing is reproduced on thin asbestos on which the hot and pliable tubing is placed for checking as the bending proceeds. For larger work the tubing is wrapped with a tight coil of asbestos-covered nickel wire through which a heating current is passed. When it is pliable it is placed on the drawing and asbestos-covered lead cable is used as a former. While the tube is being bent to shape by the application of wood blocks by the operator it is kept filled with air to prevent its collapse. This applies also in the cases of the smaller tubes and also when a machine is used for simple bends.

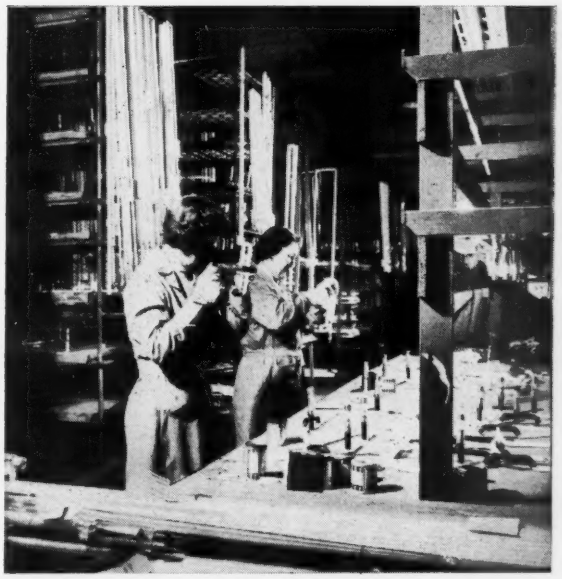
After cleaning and drying the electrodes are fitted on the ends of each section of tube and after final checking occluded gases are released and air and impurities are got rid of. Then the appropriate gas is introduced into the tube with a small quantity of mercury.

Most neon tubes are fitted with cold cathodes—open-ended iron cylinders designed so that their temperature will not exceed about 200 deg C. Hot cathodes operate at about 800 deg C and are coated with a material which emits electrons easily at a lower voltage but gradually becomes ineffective. Cold cathodes require higher voltages (easily provided by step-up transformers) but have a longer working life. The production of cathodes involves some intricate processes which are carried out by women operators.

An improved form of electrode introduced by "Claudgen" last year is designed to maintain constant uniform brightness throughout the length of a tube in cold weather. In low temperatures there is a tendency for the tubes of the lighter colours to become dark at the ends because the mercury is driven from the ends to the comparatively cool middle of the tube where it condenses.

Above: The new frontage of the Wembley works of Claude-General Neon Lights, Ltd.

Women operatives putting the finishing touches to letters formed in tubing



The new electrode has a mechanical barrier which permits of the use of a larger quantity of mercury and also retards the rate of loss from the ends of the tube.

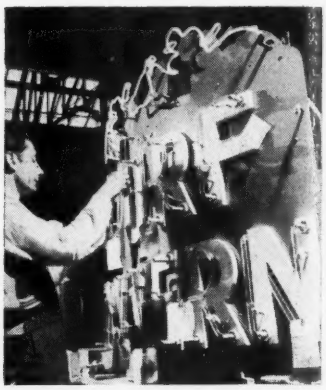
When the electrodes have been fitted to the tubes the latter are "aged" in racks by means of currents applied for periods varying according to lengths and sizes. By this process the correct hues are obtained and then the "turn-backs" of the tubes are blanked out with black lacquer.

Another important section of the works is that devoted to the fabrication of sheet steel, aluminium-bronze and stainless steel into all shapes and sizes to form letters and designs on which the tubes are mounted. Lead-covered steel, of between 10 and 24 s.w.g., is generally used for producing weatherproof metal letters.

There is much artistry in the printing department where experts operate on wood, glass, metal or "Perspex." The last named material is now being increasingly used as it gives excellent translucent colour effects when embodied in metal neon signs.

At a luncheon after the tour of the works Mr. S. D. Moyse, managing director of Claude-General Neon Lights, Ltd., spoke of the company's activities. He said that it was now twenty-five years old and for years had been the largest in the neon sign field. The company could claim that it introduced in 1934 (simultaneously with its French associates) the first commercial fluorescent tubes in the world. With the aid of the research laboratories of the parent company, the G.E.C., Claude-General claimed to produce the best h.v. illuminating tubing in the world.

The company employed about 800 people, most of them at the Wembley works. There were four sub-factories, two in London, one in Scotland and one in Manchester, as well as erection depots and sales staff throughout the country. It had to be realized that manufacture was only part of the job; the signs had to be transported, erected and maintained and the company undertook this work. Apart from maintenance contracts, the company also conducted a hire-maintenance business of large proportions by which for a monthly rental a sign would be supplied and regularly maintained.



An idea of the craftsmanship involved in sign manufacture can be gained from this "close-up" view

Mr. Moyse was confident about the future of the sign business but mentioned two great handicaps. The first was the failure of many architects to make provision for signs on commercial buildings and the second was the obstructive attitude of planning authorities. He considered that, while some control was necessary, it was being carried to absurd lengths.

Aeroscreened Lanterns Near Airports

THE two first installations of the new aeroscreened lanterns developed by the General Electric Co., Ltd., for use near airports are now, in one case, Renfrew (Glasgow), complete, and in a second case, Aberdeen, nearly complete. These aeroscreened lanterns radiate scarcely any light above the horizontal, thus obviating any risk of incoming aircraft confusing street lighting with airport approach and runway lighting. In addition to achieving this result the lanterns provide good, glarefree street lighting for the road user. It is possible to install the lanterns at the economical spacing of 120ft, and in some cases 150ft, compared with the 90 to 100ft spacings often necessary with normal "cut-off" lanterns.

At Renfrew, where new terminal buildings have recently been opened to provide better reception and departure facilities for passengers, five lanterns housing 250 W mercury lamps and mounted on Stewarts & Lloyds steel columns illuminate the car parking area, which is only a few hundred yards away from the runway. The columns and lanterns harmonize well with the contemporary architectural treatment of the terminal buildings. The electrical contractors were Wm. Allan Smith & Co., Ltd., of Edinburgh.

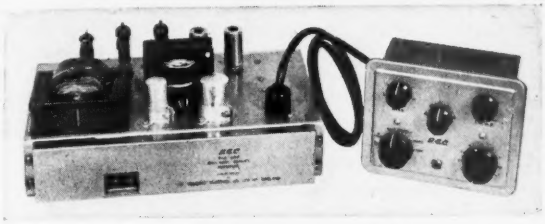
The new lanterns at Aberdeen are being installed in connection with housing development schemes at Northfield, Mastrick and Smithfield, which are within 2 miles of the boundary of the airport. Like those at Renfrew they house 250 W mercury lamps. Altogether 180 lanterns on Springbank or Stanton prestressed concrete columns are employed in these schemes. They are mounted at a height of 25ft and at 120ft spacings.

Aeroscreened lanterns near Aberdeen Airport radiate scarcely any light above the horizontal and provide good glarefree street lighting for the road user

NEW ELECTRICAL EQUIPMENT

High Quality Amplifier

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has introduced a high quality 12 W amplifier which forms part of a range of equipment designed for use with the G.E.C. metal cone loudspeaker.



G.E.C. 12 W high quality amplifier

This amplifier, which is intended primarily for use in the home, takes advantage of all the inherent qualities of the speaker and the two combined give an overall flat response which ensures orchestral balance. This, coupled with the purity of tone due to the low harmonic distortion obtained, gives an unequalled impression of realism.

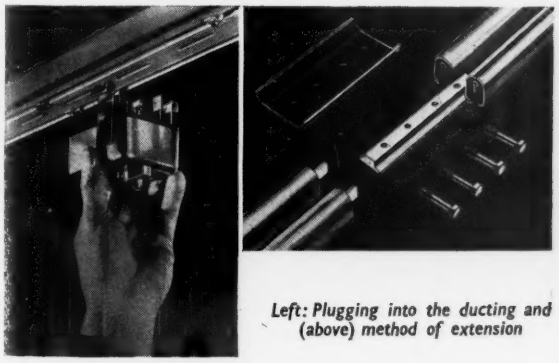
The amplifier has been designed as two units: a power amplifier chassis and a light pre-amplifier unit. The complete assembly is known as the BCS 2417/2418 pre-amplifier and power amplifier; and in general the power amplifier is best mounted at the base of the cabinet while the pre-amplifier which carries all the controls can be mounted in any position to suit the taste of the operator. The two units are connected by a multi-way cable which can be up to 20ft long. Less than 0·5 per cent distortion is obtained at the maximum power output of 12 W and the frequency response is 15 c/s to 20 kc/s ±1 dB.

Power Distribution System

The "Miniplug" power distribution for lighting fittings, office machines and small tools, manufactured by E. M. S. PRODUCTS, LTD., 28-32, The Butts, Coventry, consists of 8ft lengths of 18 s.w.g. mild steel ducting containing continuous longitudinal slots. Within each duct section a busbar in the form of a continuous spring clip is fixed and it is with this that the special plug unit may be engaged at any point. Thus, any number of lighting fittings may be instantly connected wherever most convenient.

A spring-loaded earth pin, fitted to each plug, engages in the centre slots and gives a positive "earth." This earth-pin "makes" before the plug blades engage with the busbars and "breaks" after the plug has been withdrawn. The slots are offset from the centre line of the duct section to ensure that the plugs are polarized. Side checks are fitted to the plug units which prevent incorrect insertion, protect the plug blades from accidental damage, and also act as an additional or "scraping" earth.

A feature of this equipment is the simplicity of assembly and erection of the ducting and the ease with which it can be extended or modified to suit changing conditions. The loading of the busbars is 40 A single phase, 250 V a.c. supply with a maximum capacity of the fused plugs of 13 A. Universal boxes are available for insertion between any two adjacent lengths of duct which serve as feed or switching points.



Left: Plugging into the ducting and (above) method of extension

Transistor Hearing Aid

A new transistor hearing aid incorporating a number of developments in the field of miniaturization is announced by AMPLIVOX, LTD., 2, Bentinck Street, London, W.1. The dimensions of the instrument have been reduced by as much as 25 per cent compared with the smallest valve aids, whilst the weight is only 2 oz. Transistors of greatly improved reliability are used in a fully temperature-stabilized circuit and variations in transistor characteristics are now of negligible influence upon performance. With a total current consumption of between 1½ and 2 mA, a 1·5 V "pen-light" battery will operate the instrument at satisfactory output levels for 150 hours.

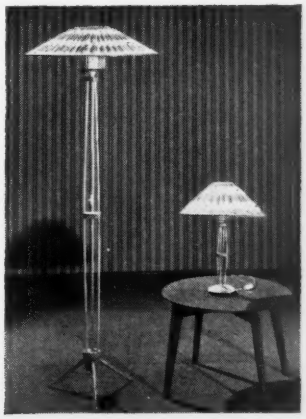
"Amplivox" transistor hearing aid

Using a sensitive E.9L earphone an overall amplification of 57 dB is achieved with a maximum output level between 120 and 130 dB above the normal hearing threshold. An acoustically equalized magnetic diaphragm type microphone of entirely new design has been introduced. Approximately 0·8in in diameter, the microphone response is free of significant resonances over the entire band of speech frequencies.

For certain cases of deafness, where high peak sound intensity cannot be tolerated, an a.v.c. model is available, in which the maximum sound output level can be controlled at two pre-set levels. The "A" series aids can be used with either a 1·5 or a 3 V battery in the same size, the latter being useful in cases of severe deafness up to 100 dB loss. Three different types of earphone are available for selective fitting.

Lighting Fittings

The "Stockholm" standard lamp and shade with matching table lamp and shade, now available from L. H.



"Stockholm" standard and table lamps

LAWRENCE & CO., 297a, Finchley Road, Hampstead, London, N.W.3, are of modernistic design and retail at about 4 gns and 35s respectively.

The standards are in natural beech and sycamore and are also available in red/white, green/white, blue/white and yellow/white finishes to match the "coolie" type shades. A diffuser is fitted below the shade to give a restful, indirect light for television or reading. The legs of the standard lamp are detachable.

Commercial Television

New Transmitter and Studios Go Into Action

LAST week the London transmitting station of the Independent Television Authority at Beulah Hill, Norwood, S.E., was opened by the Mayor of Croydon and yesterday full-scale programme services commenced. The station has been designed by Marconi's Wireless Telegraph Co., Ltd., in collaboration with the I.T.A. engineers, and built in its entirety since December last. This represents a major achievement in the face of great difficulties. Erection of the 175ft tower posed problems also, partly on account of shortage of materials and partly because of the small amount of space available. Despite these difficulties, however, the tower was constructed to schedule, and without the felling of a single tree in the station compound.

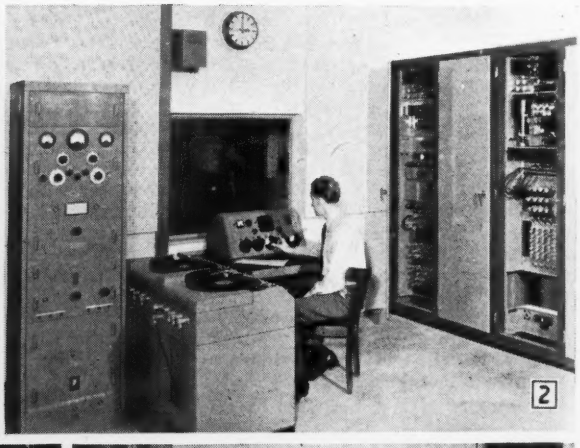
By 4th September, the 10 kW vision transmitter, the $2\frac{1}{2}$ kW sound transmitter and all ancillary equipments were installed and test signals were being radiated; reports to date indicate that the anticipated service area will be fully covered. In the near future, the existing transmitters, which are prototypes, will be augmented by two further Marconi transmitters of the same power outputs. The transmitters are fed into an 8-stack aerial array, the installation providing an effective radiated power of about 60 kW.

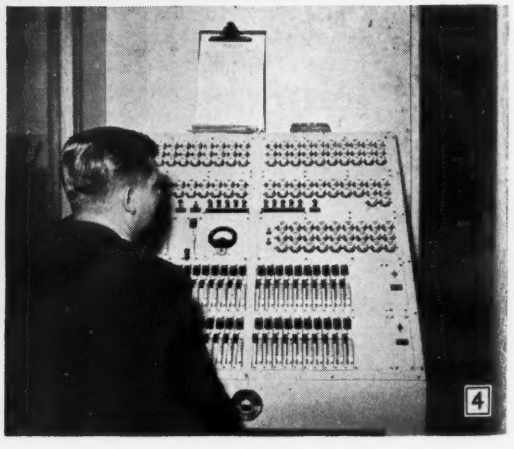
Work on the most up-to-date television studio centre in the world is now nearing completion at Wembley, where Associated-Rediffusion, Ltd., the London weekday programme contractors, are setting up their permanent studios. There will be five studios, with a master control system designed specifically for commercial television and unique in this country.

Compactness is the keynote of the design and among the highlights of the new Centre are for the first time: full remote control of all telecine facilities, comprehensive lighting control panels that can be operated single handed, permanent viewing galleries overlooking the studios for visitors, and special equipment for achieving artistic effects of the "inlay" and "overlay" type and for the quick display of captions and slides.

Plans for the conversion of the Wembley Film Studios into the new Television Centre were begun last December. Central Rediffusion Services, Ltd., who are the engineering consultants to Associated-Rediffusion, are responsible for the Centre as a whole. The design of the technical areas and the supply and installation of the vision and sound equipment have been carried out by Marconi's Wireless Telegraph Co., Ltd. The architects are Messrs. Kenchington and Farms, who were responsible for the original film studios. The work, which includes the installation of close on twenty miles of sound, vision and control cables, has been completed in record time.

1. *The main control desk at Croydon with view of the transmitter hall beyond.* **2.** *Looking into the telecine room from the control room.* **3.** *The master control room at the Wembley Studio Centre.* **4.** *The Strand Electric lighting control console at Wembley*





Domestic Electrical Equipment

Electric Fires

WITH the increase in the price of coal, and the continual improvement in the electricity generating position, electric fires are now more popular than ever and this position is reflected in the number of manufacturers in the field and the correspondingly large selection of fires available. Several makers have added to their ranges and the following survey includes many new models for the coming season.

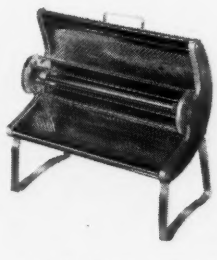
Reflector fires continue in favour, due no doubt to their greater concentration of heat and portability, but there is also a growing demand for the fuel effect models. One manufacturer of the last-mentioned type has in fact introduced a competitively priced model with a total loading of only 750 W.

Whatever type of fire is used, however, there is no doubt that as a safe, clean and speedy method of heating the electric fire continues to hold its own.

The danger of fire risks can practically be ignored now that the fitting of fire guards is obligatory.

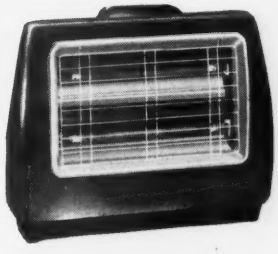
Unfortunately the price must still carry the burden of a 50 per cent purchase tax, and although there has been a slight increase in the list prices of many makes, standard 1 kW models can be obtained for as little as £3 to £4.

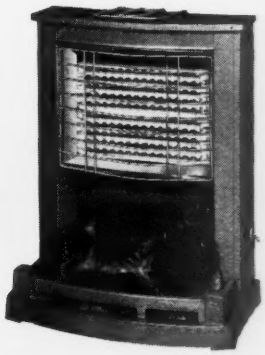
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
ARTIC FUSE & ELECTRICAL MFG. CO., LTD. Birtley, Co. Durham.	"Sun-Glade"	Floodlit portable reflector	2½ or 3 kW	Two 1¼ or 1½ kW rod	Gold	£9 7 3	£3 10 2
	"Sunny-Glow"	Floodlit portable reflector	1¼ or 1½ kW	One 1¼ or 1½ kW rod	Gold	£4 16 0	£1 16 0
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middlesex.	"Hotspur"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Silver, silver bronze, silver green	£2 15 0 (1 kW) £3 10 0 (2 kW)	£1 0 2 (1 kW) £1 5 6 (2 kW)
	"Dinkie"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Silver, silver bronze, silver green	£1 15 0 (1 kW) £2 15 0 (2 kW)	£0 12 10 (1 kW) £1 0 2 (2 kW)
	"Empire"	Portable firebar	1, 2 or 3 kW	One, two or three 1 kW bar	Beige or brown vitreous enamel	£2 10 0 (1 kW) £3 12 6 (2 kW) £4 15 0 (3 kW)	£0 18 4 (1 kW) £1 6 7 (2 kW) £1 14 10 (3 kW)
	"Solray"	Portable or wall	1 or 2 kW	One or two 1 kW rod	Cream and black	£3 17 0 (1 kW) £4 18 0 (2 kW)	£1 8 3 (1 kW) £1 16 0 (2 kW)
	"Dainty"	Portable firebar	2 kW	Two 1 kW bar	(a) Light bronze and (b) Electro-plated bronze	£4 5 0 (a) £5 2 6 (b)	£1 11 2 (a) £1 17 7 (b)
	"County"	Portable reflector	2 or 3 kW	Two or three 1 kW rod	Rippled silver, green or bronze	£5 2 6 (2 kW) £6 2 6 (3 kW)	£1 17 7 (2 kW) £2 4 11 (3 kW)
	"Modern"	Portable reflector	2 kW	Two 1 kW rod	Light bronze	£6 10 0	£2 7 8
	"Cheery"	Imitation coal	2 kW	Two 1 kW bar	Rippled silver or bronze	£7 7 6	£2 14 1



Artic Fuse "Sunny-Glow" floodlit fire

Belling "Modern" and (right) Belling "Cheery"

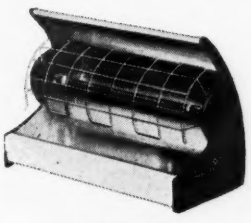




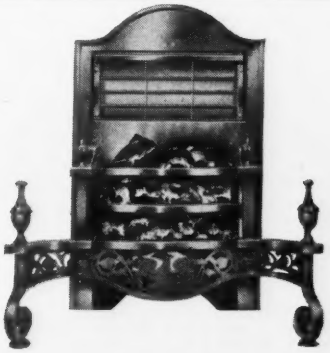
ELECTRIC FIRES . . . . . *continued*

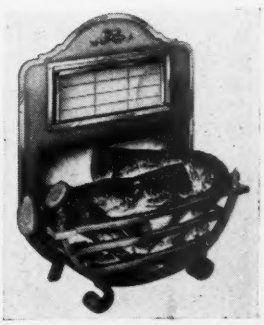
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BELLING & CO., LTD., **Bridge Works,** **Southbury Road,** **Enfield,** **Middlesex.** *(continued)*	" Adam "	Period	2 or 3 kW	Two or three 1 kW bar	Bright antique	£10 10 0 (2 kW) £12 10 0 (3 kW)	£3 17 0 (2 kW) £4 11 6 (3 kW)
	" Princess "	Imitation coal	2 or 3 kW	Two or three 1 kW rod	Rippled silver, light bronze, dark bronze or silver green	£9 12 6 (2 kW) £10 10 0 (3 kW)	£3 10 7 (2 kW) £3 17 0 (3 kW)
	" Princess "	Imitation log	2 or 3 kW	Two or three 1 kW rod	Rippled silver, light bronze, dark bronze or silver green	£10 4 0 (2 kW) £11 2 0 (3 kW)	£3 14 10 (2 kW) £4 1 5 (3 kW)
	" Medieval "	Imitation coal or log	2 kW	Two 1 kW bar	Antique	£12 12 6 (coal) £14 2 6 (log)	£4 12 7 (coal) £5 3 7 (log)
	" Waverley "	Imitation coal	3 kW	Three 1 kW bar or rod	Beige	£16 7 6 (bar) £17 2 6 (rod)	£6 0 1 (bar) £6 5 7 (rod)
	" Waverley "	Imitation coal	3 kW	Three 1 kW bar or rod	Electro-plated bronze	£20 10 0 (bar) £21 5 0 (rod)	£7 10 4 (bar) £7 15 10 (rod)
	" Melrose "	Illuminated	3 kW	Three 1 kW bar or rod	Beige	£14 5 0 (bar) £15 0 0 (rod)	£5 4 6 (bar) £5 10 0 (rod)
	" Melrose "	Illuminated	3 kW	Three 1 kW bar or rod	Electro-plated bronze	£16 7 6 (bar) £19 2 6 (rod)	£6 14 9 (bar) £7 0 3 (rod)
	" Converta "	Fireplace screen	2 kW	Two 1 kW bar or rod	Rippled bronze	£7 0 0 (bar) £7 10 0 (rod)	£2 11 4 (bar) £2 15 0 (rod)
	" Hearth "	Imitation coal or log	2 kW	Two 1 kW bar	Bright antique	£7 17 6 (coal) £9 12 6 (log)	£2 17 9 (coal) £3 10 7 (log)
	" C/1 " and " C/2 "	Firebar inset	1 or 2 kW	One or two 1 kW bar	Electro-plated bronze	£2 7 6 (1 kW) £3 5 0 (2 kW)	£0 17 5 (1 kW) £1 3 10 (2 kW)
	" F/2 "	Firebar inset	2 kW	Two 1 kW bar	Electro-plated bronze	£3 15 0	£1 7 6
	" G/2 "	Reflector inset	2 kW	Two 1 kW rod	Electro-plated bronze	£4 12 6	£1 13 11
	Wall Panel	For C/1, C/2, F/2 and G/2	—	—	Rippled bronze	£0 15 0	£0 5 6
	" Homeguard "	Safety reflector	2 kW	Two 1 kW (concealed)	Rippled silver, bronze and green	£10 0 0	£3 13 4
	" Celtic "	Period log	3 kW	Three 1 kW (concealed)	Antique	£29 15 0	£10 18 2
	" Adam "	Period coal	3 kW	Three 1 kW (concealed)	Antique	£28 10 0	£10 9 0
BERRY'S ELECTRIC, LTD., **Touchbutton House,** **Newman Street,** **London, W.1.**	" Masterberry "	Reflector, imitation fuel	2 kW	Four 500 W rod	Warm silver and polished	£15 0 0	£5 9 9
	" Beryl " 630	Reflector	1 kW	One 1 kW bar	Warm silver	£2 14 0	£0 19 0
	" Vanguard " 628	Reflector	2 kW	Two 1 kW bar	Warm silver with black base	£5 19 6 £6 19 6 (with safety switch)	£2 3 8 £2 11 0 (with safety switch)
	" Mistoberry " 417	Radiant	2 kW	Two 1 kW bar	Polished rustless metal	£22 1 0 (single lighting) £24 2 0 (double lighting)	£8 1 3 (single lighting) £8 16 3 (double lighting)
	" Berrylog " A.28	Open hearth, log fire	No heat (see Curb Heaters)	—	—	£9 0 0 (standard) £12 15 6 (special)	£3 5 10 (standard) £4 13 6 (special)
	" Homeberry " 442	Reflector, imitation fuel	2 kW	Two 1 kW rod	Warm silver and polished	£9 12 6	£3 10 4
	" Mayberry " 441	Reflector, imitation fuel	2 kW	Two 1 kW rod	Warm silver and polished	£11 17 6	£4 6 10

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1. (continued)	"Alderberry" 110	Reflector, imitation fuel	2 kW	Two 1 kW bar	Armour bright, satin brass enrichments	£19 10 0	£7 2 7
	"Woodberry" 406	Radiant, imitation fuel	3 kW	Two 1½ kW bar	Armour bright	£15 17 6	£5 16 1
	"Emberberry" 108 & 109	Radiant, imitation fuel	2 kW	One 2 kW bar	Armour bright	£16 2 6 £18 8 6 (109: with dogs)	£5 17 11 £6 14 9 (109: with dogs)
	"Berrylog" A.21/S and A.21/O	Radiant, imitation fuel	1½ kW	One 1½ kW bar	Satin antique	£9 18 6 (A.21/S) £10 12 6 (A.21/O)	£3 12 7 (A.21/S) £3 17 8 (A.21/O)
	"Adjustaberry" 457/C	Radiant, imitation fuel	2½ kW	Two 1¼ kW bar	Armour bright	£12 7 6	£4 10 6
	"Wilton" 42	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Antique, bright, rustless	£69 0 0	£26 18 2
	"Fleur-de-Lis" 40	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Armour bright	£34 17 6	£13 12 0
	"Jacobean" 14	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Armour bright	£33 10 0	£13 1 3
	"Jacobean" 5	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Armour bright	£29 0 0	£11 6 2
	"Queen Anne" 11	Pedestal, reflector, imitation fuel	3 kW	Two 1½ kW bar	Antique, bright, rustless	£47 16 6	£18 13 0
	"Adam Shell" 8	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Antique, bright, rustless	£43 17 6	£17 2 3
	"Georgian" 2	Reflector, imitation fuel	3 kW	Two 1½ kW bar	Antique, bright, rustless	£37 17 6	£14 15 5
	"Regency" 20	Reflector, imitation fuel	2 kW	Two 1 kW bar	Antique, bright, rustless	£32 10 6	£12 13 9
	Curb Heater 457	Radiant	3½ kW	Two 1¾ kW bar	Armour bright	£7 13 6	£2 16 2
	Curb Heater 980	Radiant	2½ kW	Two 1¼ kW bar	Armour bright	£9 0 0	£3 5 10
	Curb Heater 98E	Radiant	2 or 2¾ kW	One 2 or 2¾ kW bar	Armour bright	£9 0 0 (2 kW) £11 15 0 (2¾ kW)	£3 5 10 (2 kW) £4 5 11 (2¾ kW)
BESCOL ELECTRIC, LTD., Parkfield Road, Birmingham, 8.	"Swallow"	Portable reflector	2 kW	Two 1 kW rod	Cream frame, pastel green sides	£3 14 0	£1 7 2
BRATT, COLBRAN, LTD., 10, Mortimer Street, London, W.1.	DETAILS OF NEW SEASON'S RANGE AND PRICES TO BE ANNOUNCED						
BRITISH NATIONAL ELECTRICS, LTD., Newarthill, Motherwell, Lanarkshire.	P.20	Convector	2 kW	Two 1 kW rod	Black crackle or hammer grey, gold louvres	£11 0 0	£4 0 6
	P.15	Convector	2 kW	Two 1 kW rod	Black crackle or hammer grey, gold mesh	£7 15 0	£2 16 10



B.N.E. F.104

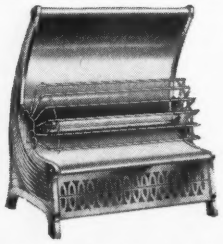




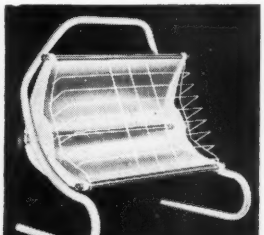
Berry's "Regency" and (right) Berry's "Alderberry"

ELECTRIC FIRES . . . . . *continued*

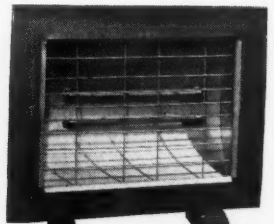
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BRITISH NATIONAL ELECTRICS, LTD., Newarthill, Motherwell, Lanarkshire. *(continued)*	F.102	Portable	2 kW	Two 1 kW bar	Old gold	£3 5 0	£1 3 10
	F.101	Portable	1 kW	One 1 kW bar	Old gold	£2 5 0	£0 16 6
	F.104	Reflector	1 kW	One 1 kW rod	Chocolate and ivory enamel	£3 0 0	£1 2 6
BULPITT & SONS, LTD., St. George's Works, Icknield Street, Birmingham, 18.	"Waldorf" 820	Portable reflector	1 kW	One 1 kW rod	Cream and green stoved enamel	£2 2 0	£0 15 4
	"Woodstock" 831	Portable reflector	1 kW	One 1 kW rod	Gold or satin silver stoved enamel	£4 0 0	£1 9 3
	"Woodstock" 832	Portable reflector	2 kW	Two 1 kW rod	Gold or satin silver stoved enamel	£6 2 6	£2 4 9
	"Cromwell" 795	Portable reflector	2 kW	Two 1 kW rod	Armour bright or old brass	£9 5 0	£3 7 8
CARRON CO., Carron, Falkirk.	"Sirius"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Vitreous enamel	£2 2 6 (1 kW) £3 7 6 (2 kW)	£0 15 6 (1 kW) £1 4 9 (2 kW)
	"Curtsey"	Portable reflector	1 or 2 kW	One or two 1 kW rod	"Carrontine"	£2 2 6 (1 kW) £3 1 6 (2 kW)	£0 15 6 (1 kW) £1 2 6 (2 kW)
	Pedestal	Portable reflector	1 or 2 kW	One or two 1 kW rod	Art silver	£2 19 0 (1 kW) £3 19 6 (2 kW)	£1 1 6 (1 kW) £1 9 0 (2 kW)
	"Sunglo"	Portable reflector	2½ kW	Two 1¼ kW rod	Chromium	£8 12 0	£3 3 0



Cranmer & Cheshire "Nichro"

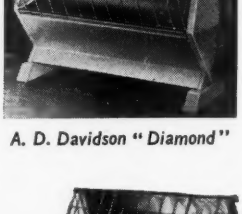


Dowsing N.121

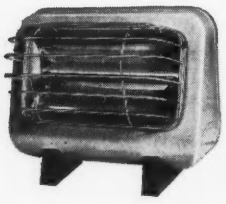


Dexray R.22 2 kW model

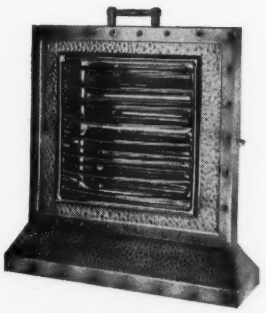
Carron "Curtsey"

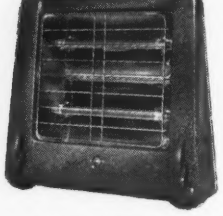


A. D. Davidson "Diamond"



Bulpitt 820 "Waldorf" and (right) Bulpitt "Cromwell" 795

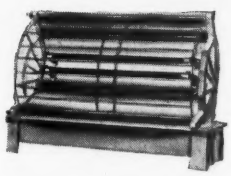




C.W.S. "Windsor"

C.W.S. "Ascot"

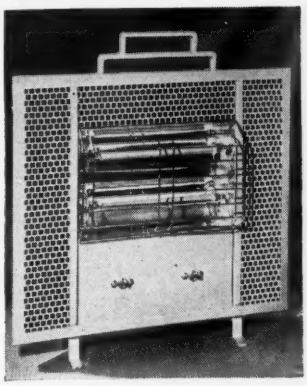
Crosslands 2 kW "Raydant"



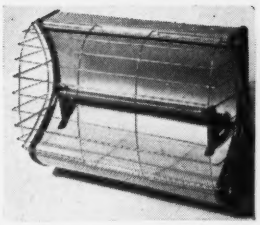
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley.	"Windsor"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Vitreous enamel	£3 3 3 (1 kW) £5 4 9 (2 kW)	£1 3 9 (1 kW) £1 19 3 (2 kW)
	"Ascot"	Portable or wall mounting parabolic	1 kW	One 1 kW rod	"Dimenso" stoved enamel	£2 6 8	£0 17 6
	"Eden"	Portable	1 or 2 kW	One or two 1 kW bar	"Dimenso" stoved enamel	£1 18 8 (1 kW) £2 18 0 (2 kW)	£0 14 6 (1 kW) £1 1 9 (2 kW)
	"Avon"	Portable	1 or 2 kW	One or two 1 kW bar	"Dimenso" stoved enamel	£1 11 3 (1 kW) £2 6 8 (2 kW)	£0 11 9 (1 kW) £0 17 6 (2 kW)
CRANMER & CHESHIRE LTD., Steward Street, Spring Hill, Birmingham, 18.	422	Portable tilting reflector	1 or 2 kW	One or two 1 kW rod	Silver grey	£3 5 0 (1 kW) £4 0 6 (2 kW)	£1 3 9 (1 kW) £1 9 5 (2 kW)
	424	Portable double tilting reflector	2 kW	Two 1 kW rod	Silver grey	£5 10 0	£2 0 3
	426	Wall fixing (bathroom)	1 kW	One 1 kW rod	Silver grey	£3 6 6	£1 4 4
	429	Wall fixing (bathroom)	¾ kW	One ¾ kW rod	Silver grey	£3 3 0	£1 3 0
	430	Portable tilting reflector	¾ or 1½ kW	One or two ¾ kW rod	Silver grey	£2 19 6 (¾ kW) £3 13 6 (1½ kW)	£1 1 9 (¾ kW) £1 6 10 (1½ kW)
	438	Portable tilting reflector with glow lamp behind grille	2 kW	Two 1 kW rod	Silver grey	£5 15 0	£2 2 1
CROSSLANDS (RUGELEY), LTD., 55, Ebury Street, London, S.W.1.	"Raydant" 800/1	Portable reflector	1 kW	One 1 kW rod	Cream frame, chromium reflector and guard	£2 7 6	£0 17 2
	"Raydant" 800/2	Portable reflector	2 kW	Two 1 kW rod	Cream frame, chromium reflector and guard	£3 4 2	£1 3 2
A. D. DAVIDSON ELECTRIC CO., 62, Granville Street, Birmingham, 1.	"Davey" F220	Portable reflector	1 kW	One 1 kW rod	Chromium on brass	£2 11 6	£0 18 10
	"Davey" F221	Portable reflector	2 kW	Two 1 kW rod	Chromium on brass	£3 16 0	£1 7 9
	"Diamond" F230	Portable reflector	1 kW	One 1 kW rod	Stone or pastel green	£2 17 6	£1 1 0
	"Diamond" F231	Portable reflector	2 kW	Two 1 kW rod	Stone or pastel green	£3 5 6	£1 4 0
DEXRAY ENGINEERING CO., LTD., 34, Ardwick Green South, Manchester, 13.	R.23	Portable reflector	2 kW	Two 1 kW rod	Hammer bronze or cream	£6 0 0	£2 5 0
	R.21 and R.22	Portable reflector	1 or 2 kW	One or two 1 kW rod	Bronze	£3 15 0 (R.21) £4 10 0 (R.22)	£1 8 1 (R.21) £1 13 9 (R.22)
	R.10	Portable or inset	2 kW	Two 1 kW rod	Cream or cream/gold	£6 5 0	£2 6 10
	R.15	Wall mounting	1 kW	One 1 kW rod	Cream and black	£3 10 0	£1 6 3
	R.20	Reflector (contemporary styled)	2 kW	Two 1 kW rod	Cream or hammer bronze stoved enamel	£8 0 0	£3 0 0
	R.25	Reflector (de-luxe)	2 kW	Two 1 kW rod	Silver glass mirror panels	£13 6 8	£5 0 0
DOWSING CO. (ELECTRICAL MANUFACTURERS), LTD., Kangley Bridge Road, Lower Sydenham, S.E.26.	N.102	Portable reflector	750 W	One 750 W rod	Cream enamel	£2 3 10	£0 16 0
	N.112	Portable reflector	1 kW	One 1 kW rod	Cream enamel	£2 5 0	£0 16 6

ELECTRIC FIRES . . . . . *continued*

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
DOWSING CO. (ELECTRICAL MANUFACTURERS), LTD., Kangley Bridge Road, Lower Sydenham, S.E.26. *(continued)*	N.151	Portable reflector	2 kW	Two 1 kW rod	Cream enamel	£3 0 0	£1 1 11
	N.121	Portable reflector	1 kW	One 1 kW rod	Cream enamel	£2 10 0	£0 18 3
	N.131	Portable reflector	2 kW	Two 1 kW rod	Cream enamel	£3 0 0	£1 1 11
E.R. COMPANY, Elliott Works, Elliott Road, Bromley, Kent.	—	Bowl	500 W	One 500 W spiral	Copper or aluminium	£1 5 10 (copper) £1 0 10 (aluminium)	£0 8 9 (copper) £0 7 10 (aluminium)
ELECTROWAY HEATERS, LTD., Rosebery Street, Loughborough, Leics.	IR12, VH2 and VH3	Inset, vertical reflector	1, 2 and 3 kW	One, two and three 1 kW rod	Chromium	£2 11 0 (IR12) £3 15 0 (VH2) £5 10 0 (VH3)	£0 18 8 (IR12) £1 7 6 (VH2) £2 0 4 (VH3)
	VK2 and IA2	Inset, vertical (VK2) and parabolic reflector (IA2)	2 kW	Two 1 kW rod	Chromium	£5 13 0 (VK2) £6 11 0 (IA2)	£2 1 5 (VK2) £2 8 0 (IA2)
	IH1R, IH2R and IH3R	Inset, horizontal reflector	1, 2 and 3 kW	One, two and three 1 kW rod	Chromium	£3 1 6 (IH1R) £4 6 0 (IH2R) £6 19 0 (IH3R)	£1 2 7 (IH1R) £1 11 6 (IH2R) £2 11 0 (IH3R)
	IH1, IH2 and IH3	Inset, panel bar	1, 2 and 3 kW	One, two and three 1 kW bar	Chromium	£2 15 3 (IH1) £3 14 3 (IH2) £5 18 6 (IH3)	£1 0 3 (IH1) £1 7 3 (IH2) £2 3 5 (IH3)
	IE1R, IE2R and IE3R	Inset, horizontal reflector	1, 2 and 3 kW	One, two and three 1 kW rod	Stoved enamel	£1 19 0 (IE1R) £3 3 6 (IE2R) £5 6 6 (IE3R)	£0 14 4 (IE1R) £1 3 3 (IE2R) £1 19 1 (IE3R)
	IE1, IE2 and IE3	Inset, panel bar	1, 2 and 3 kW	One, two and three 1 kW bar	Stoved enamel	£1 17 0 (IE1) £2 17 0 (IE2) £4 6 3 (IE3)	£0 13 7 (IE1) £1 0 11 (IE2) £1 11 8 (IE3)
	IG1R and IG2R	Wall, horizontal reflector	1 and 2 kW	One or two 1 kW rod	Stoved enamel	£2 15 0 (IG1R) £3 17 9 (IG2R)	£1 0 2 (IG1R) £1 8 6 (IG2R)
	IG1 and IG2	Wall, panel bar	1 and 2 kW	One or two 1 kW bar	Stoved enamel	£2 11 3 (IG1) £3 3 9 (IG2)	£0 18 9 (IG1) £1 3 5 (IG2)
	WIR12, WVH2 and WVH3	Wall, vertical reflector	1, 2 and 3 kW	One, two and three 1 kW rod	Chromium, stoved enamel plaque	£3 18 9 (WIR12) £5 3 0 (WVH2) £6 18 0 (WVH3)	£1 8 11 (WIR12) £1 17 9 (WVH2) £2 10 7 (WVH3)
	WH2	Wall, panel bar	2 kW	Two 1 kW bar	Chromium, stoved enamel plaque	£5 2 3	£1 17 6
	WH2R	Wall, horizontal reflector	2 kW	Two 1 kW rod	Chromium, stoved enamel plaque	£5 14 0	£2 1 10
	WE2	Wall, panel bar	2 kW	Two 1 kW bar	Stoved enamel fire and plaque	£4 5 6	£1 11 4
	WE2R	Wall, horizontal reflector	2 kW	Two 1 kW rod	Stoved enamel fire and plaque	£4 13 3	£1 14 2
	IG2F	Wall, ring main, panel	2 kW	Two 1 kW bar	Chromium or stoved enamel	£3 17 9	£1 8 6
	R12	Wall, bathroom or portable	1 kW	One 1 kW rod	Hammered silver stoved enamel	£2 14 9	£1 0 1
	510 and 520	Portable, panel bar	1 and 2 kW	One or two 1 kW bar	Stoved enamel	£1 8 6 (510) £2 7 3 (520)	£0 10 6 (510) £0 17 4 (520)
	710 and 720	Portable, panel bar	1 and 2 kW	One or two 1 kW bar	Stoved enamel	£1 10 6 (710) £2 8 6 (720)	£0 11 2 (710) £0 17 9 (720)



Left: Falk, Stadelmann "Felicity" 95704 and (below) Falk, Stadelmann bowl fire 95664

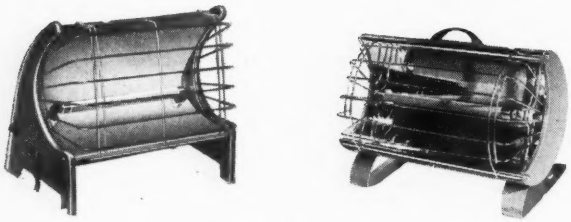


Ferranti builders' model P.5160

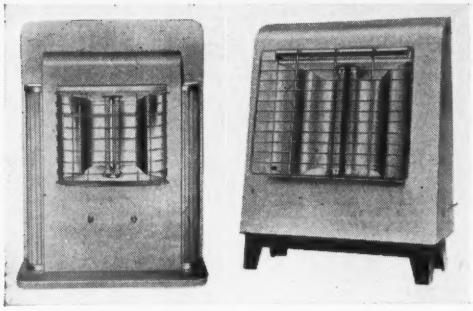
Right: Ferranti wall model W.5148

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
ELECTROWAY HEATERS, LTD., Rosebery Street, Loughborough, Leics. *(continued)*	71 and 72	Portable, horizontal reflector	1 and 2 kW	One or two 1 kW rod	Stoved enamel	£1 16 0 (71) £2 19 0 (72)	£0 13 2 (71) £1 1 8 (72)
	R2	Portable, twin parabolic reflector	2 kW	Two 1 kW rod	Hammered silver	£4 16 9	£1 15 6
	95	Portable, screen, vertical reflector	2 kW	Two 1 kW rod	Silver grey, chromium fitments	£6 19 9	£2 11 3
FALCO ELECTRICAL APPLIANCES, LTD., Corporation Road, Audenshaw, Manchester.	"Falco-Solo" EF.40	Portable reflector	1 kW	One 1 kW rod	Cream enamel	£2 10 6	£0 18 6
	"Falco-Duo" EF.35	Portable reflector	2 kW	Two 1 kW rod	Stoved enamel, various shades	£5 10 0	£2 0 3
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	"Olympian" 95708 and 95709	Portable reflector	1 and 2 kW	One and two 1 kW rod	Hammered bronze	£2 17 6 (95708) £3 13 0 (95709)	£1 1 1 (95708) £1 6 9 (95709)
	"Economist" 95655 and 95656	Portable reflector, wall mounting	1 and 2 kW	One and two 1 kW rod	Cream with black feet	£2 15 0 (95655) £3 10 0 (95656)	£1 0 2 (95655) £1 5 8 (95656)
	Bathroom 95670	Wall mounting reflector	1 kW	One 1 kW rod	Cream	£3 6 0	£1 4 3
	"Felicity" 95704	Portable reflector, screen, illuminated	2 kW	Two 1 kW rod	Polychromatic gold and colours	£7 2 6 (gold) £7 10 0 (colours)	£2 12 3 (gold) £2 15 0 (colours)
	"Seren ty" 95705	Portable reflector, screen, illuminated	2 kW	Two 1 kW rod	Polychromatic gold	£10 10 0	£3 17 0
	95664	Portable bowl reflector	600 W	One 600 W spiral	Hammered grey	£1 5 0	£0 9 2
FALKIRK IRON CO., LTD., Falkirk, Stirlingshire.	"Falco" 39 and 41	Portable reflector	1 and 2 kW	One or two 1 kW rod	Green, cream, blue and gold	£2 6 0 (39) £4 0 0 (41)	£0 16 10 (39) £1 9 3 (41)
	"Advance" 496 and 497	Portable, panel bar	1 and 2 kW	Two 500 W bar (496) and two 1 kW bar (497)	—	£1 11 6 (496) £2 9 6 (497)	£0 11 6 (496) £0 18 1 (497)
	"Allan" 699 and 700	Portable, panel bar	1 and 2 kW	One or two 1 kW bar	—	£1 11 6 (699) £2 9 6 (700)	£0 11 6 (699) £0 18 1 (700)
FERRANTI, LTD., Hollinwood, Lancs.	F.4144	Floor reflector	1 kW	One 1 kW rod	Cream enamelled	£2 13 4	£0 19 6
	F.5164	Floor reflector	2 kW	Two 1 kW rod	Cream enamelled	£3 19 6	£1 9 1
	F.4140	Floor reflector	2 kW	Two 1 kW rod	Cream with brown enamelled legs	£6 10 0	£2 7 6

ELECTRIC FIRES . . . . . *continued*



Gatehill "Richmond" and (right) Gatehill "Curzon"



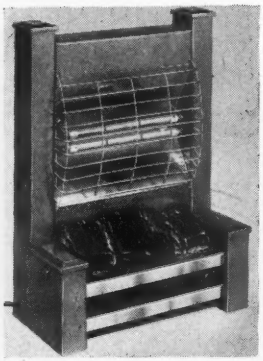
G.E.C. "Cosyglo" screen fire (left) and contemporary styled portable reflector fire

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
FERRANTI, LTD., Hollinwood, Lancs. *(continued)*	F.3111	Floor reflector	2½ kW	Two 1¼ kW rod	Silver or copper enamelled	£10 17 6	£3 19 6
	F.3117	Floor reflector, illuminated	2½ kW	Two 1¼ kW rod	Silver or copper enamelled	£12 5 0	£4 9 7
	F.3102	Floor reflector	1½ kW or 2 kW	Two 750 W or two 1 kW rod	Cream enamelled	£7 10 0	£2 14 10
	F.3108	Floor reflector	2 kW or 2½ kW	Two 1 kW or two 1,250 W rod	Cream enamelled	£8 8 0	£3 1 5
	W.5148	Wall reflector (bathrooms, etc.)	1 kW	One 1 kW rod	Cream or silver enamelled	£3 15 0	£1 7 5
	W.5150	Wall reflector (bathrooms, etc.)	2 kW	Two 1 kW rod	Bronze and cream enamelled	£4 10	£1 12 11
	P.5160	Builders' fire reflector	2 kW	Two 1 kW rod	Bronze and cream enamelled	£4 11 8	£1 13
	P.3310	Panel reflector, ventilating grille	2½ kW	Two 1,250 W rod	Chromium frame and decorative screen	£24 10 6	£8 19 5
	P.33132	Panel reflector	2 kW	Two 1 kW rod	Chromium	£16 2 6	£5 18 0
	P.33122	Panel reflector	1½ kW	Two 750 W rod	Chromium	£12 10 0	£4 11 5
H. FROST & CO., LTD., Walsall.	"Sunhouse" 147, 148 A.C. and 148 A.C./D.C.	Portable panel bar	1 kW (147) and 2 kW (148)	One and two 1 kW bar	Terra cotta and satin rustless guard	£1 19 6 (147) £2 17 0 (148 A.C.) £2 19 3 (148 A.C./D.C.)	£0 14 6 (147) £1 0 11 (148 A.C.) £1 1 10 (148 A.C./D.C.)
	"Sunhouse" 261, 262 A.C. and 262 A.C./D.C.	Portable reflector	1 kW (261) and 2 kW (262)	One and two 1 kW rod	Chromium and matt black	£2 10 0 (261) £3 5 9 (262 A.C.) £3 8 3 (262 A.C./D.C.)	£0 18 5 (261) £1 4 2 (262 A.C.) £1 5 1 (262 A.C./D.C.)
	"Sunhouse" 163	Bathroom reflector	1 kW	One 1 kW rod	Chromium and cream	£3 17 0	£1 8 4
	"Sunhouse" 172 and 172 C.P.	Inset reflector	2 kW	Two 1 kW rod	Brown hammered stoved enamel (172) and chromium (172 C.P.)	£4 4 0 (172) £5 18 0 (172 C.P.)	£1 10 10 (172) £2 3 4 (172 C.P.)
	"Sunhouse" 177 and 177 C.P.	Inset reflector	1 kW	One 1 kW rod	Brown hammered stoved enamel (177) and chromium (177 C.P.)	£1 19 0 (177) £2 11 6 (177 C.P.)	£0 14 4 (177) £0 18 11 (177 C.P.)
	"Sunhouse" A.17 and A.17 C.P.	Inset reflector	2 kW	Two 1 kW rod	Brown hammered stoved enamel (A.17) and chromium (A.17 C.P.)	£3 6 3 (A.17) £4 5 6 (A.17 C.P.)	£1 4 4 (A.17) £1 11 5 (A.17 C.P.

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
H. FROST & CO., LTD., Walsall. *(continued)*	"Sunhouse" B.17 and B.17 C.P.	Inset reflector	1 kW	One 1 kW rod	Brown hammered stoved enamel (B.17) and chromium (B.17 C.P.)	£2 1 3 (B.17) £3 4 3 (B.17 C.P.)	£0 15 2 (B.17) £1 3 8 (B.17 C.P.)
	"Sunhouse" A.14 and A.14 C.P.	Inset panel bar	1 kW	One 1 kW bar	Brown hammered stoved enamel (A.14) and chromium (A.14 C.P.)	£2 0 0 (A.14) £3 3 3 (A.14 C.P.)	£0 14 8 (A.14) £1 3 3 (A.14 C.P.)
	"Sunhouse" A.24 and A.24 C.P.	Inset panel bar	2 kW	Two 1 kW bar	Brown hammered stoved enamel (A.24) and chromium (A 24 C.P.)	£3 0 6 (A.24) £4 13 6 (A.24 C.P.)	£1 2 3 (A.24) £1 14 4 (A.24 C.P.)
	"Sunhouse" 4021 and 7021	Inset reflector	2 kW	Two 1 kW rod	Brown hammered stoved enamel	£4 7 6 (4021) £6 9 3 (7021)	£1 12 2 (4021) £2 7 6 (7021)
	"Sunhouse" 7031	Inset reflector	3 kW	Two 1½ kW rod	Brown hammered stoved enamel	£6 17 6	£2 10 6
	"Sunhouse" 401 and 402	Wall panel reflector	1 or 2 kW	One or two 1 kW rod	Brown hammered stoved enamel	£2 6 9 (401) £3 10 0 (402)	£0 17 2 (401) £1 5 9 (402)
	"Sunhouse" 403 and 404	Wall panel bar	1 or 2 kW	One or two 1 kW bar	Brown hammered stoved enamel	£2 5 3 (403) £3 7 9 (404)	£0 16 8 (403) £1 4 11 (404)
	"Sunhouse" 4020 and 7020	Wall panel reflector	2 kW	Two 1 kW rod	Brown hammered stoved enamel	£5 4 0 (4020) £8 11 0 (7020)	£1 18 3 (4020) £3 2 10 (7020)
	"Sunhouse" 7030	Wall panel reflector	3 kW	Two 1½ kW rod	Brown hammered stoved enamel	£8 19 0	£3 5 9
	"Sunhouse" A.17/P and 7061	Wall panel reflector	2 kW	Two 1 kW rod	Brown hammered stoved enamel	£4 7 6 (A.17/P) £3 11 9 (7061)	£1 12 2 (A.17/P) £1 6 4 (7061)
G.B.M. (ELECTRICAL) BIRMINGHAM, 439, Moseley Road, Birmingham, 12.	R.F.1	Portable corrugated reflector	1 kW	One 1 kW rod	Cream stoved enamel	£1 19 2	£0 14 4
	R.F.2	Portable corrugated reflector	2 kW	Two 1 kW rod	Cream stoved enamel	£2 19 2	£1 1 10
GATEHILL MANUFACTURING CO., LTD., Crown Works, Crown Yard, Stanhope Street, N.W.1.	"Richmond"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Gold and mushroom	£1 9 2 (1 kW) £2 4 11 (2 kW)	£0 10 8 (1 kW) £0 16 10 (2 kW)
	"Curzon"	Wall mounting reflector	1 or 2 kW	One or two 1 kW rod	Gold and mushroom	£1 15 0 (1 kW) To be announced (2 kW)	£0 12 8 (1 kW)
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	D.2342G	Portable firebar	2 kW	Two 1 kW bar	Beige or green	£3 16 0	£1 7 9
	D.2391G	Inset	1 kW	One 1 kW bar	(a) Bronze (b) Hammered bronze	£2 4 0 (a) £2 8 0 (b)	£0 16 1 (a) £0 17 7 (b)
	D.2392G	Inset	2 kW	Two 1 kW bar	(a) Bronze (b) Hammered bronze	£3 8 0 (a) £3 12 0 (b)	£1 4 10 (a) £1 6 4 (b)
	D.2394G and D.2395G	Wall mounting	1 or 2 kW	One or two 1 kW bar	Beige	£3 10 0 (D.2394G) £4 15 0 (D.2395G)	£1 5 7 (D.2394G) £1 14 9 (D.2395G)
	D.2496G and D.2497G	Portable firebar	1 or 2 kW	One or two 1 kW bar	Bronze, cream or green	£1 16 6 (D.2496G) £2 15 0 (D.2497G)	£0 13 4 (D.2496G) £1 0 1 (D.2497G)
	D.2757	Bowl	750 W	One 750 W spiral	Cream	£1 17 6	£0 13 9
	D.2766 and D.2767	Portable or wall mounting reflector	1 or 2 kW	One or two 1 kW rod	Cream	£3 5 6 (D.2766) £4 3 0 (D.2767)	£1 3 11 (D.2766) £1 10 4 (D.2767)
	D.2773 and D.2774	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream or silver bronze	£2 15 0 (D.2773) £3 12 6 (D.2774)	£1 0 1 (D.2773) £1 6 6 (D.2774)

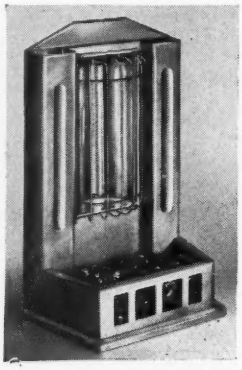
ELECTRIC FIRES . . . . . *continued*

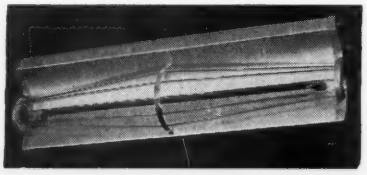
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. *(continued)*	D.2812 and D.2813 "Cosyglo"	Portable reflector	2 kW	Two 1 kW rod	(*a*) Cream or silver bronze (*b*) Green or silver bronze with black base	£4 18 6 (*a*) £5 15 0 (*b*)	£1 16 0 (*a*) £2 2 1 (*b*)
	D.2814 "Cosyglo"	Screen reflector	2 kW	Two 1 kW rod	Hammered bronze	£11 10 0	£4 4 1
	D.2852G "Cosyglo"	Inset	2 kW	Two 1 kW rod	(*a*) Bronze (*b*) Hammered bronze	£5 11 6 (*a*) £5 16 0 (*b*)	£2 0 9 (*a*) £2 2 5 (*b*)
	D.2853 "Cosyglo"	Wall mounting	2 kW	Two 1 kW rod	Cream or hammered bronze	£6 8 0	£2 6 10
GRAFTON HEATER CO., LTD., 13-15, Westland Place, London, N.1.	"Grafton"	Portable reflector, coal effect	750 W	One 750 W rod	Various colours	£2 13 6	£0 16 0
	"Grafton"	Portable reflector, coal effect	2 kW	Two 1 kW rod	Various colours	£6 6 0	£2 14 0
	9	Reflector	2 kW	Two 1 kW rod	Cream enamel	£3 0 0	£1 2 6
	106/36	Bowl	600 W	One 600 W E.S.	Various colours	£1 10 0	£0 11 3
H.M.V. HOUSEHOLD APPLIANCES, Hayes, Middlesex.	"Lincoln" F.3	Multi-parabola reflector	2 or 3 kW	Two 1½ or 1 kW rod	Hammered stoved enamel grey	£6 18 4	£2 10 8
	"Ely" F.1	Multi-parabola reflector	1 kW	One 1 kW rod	Hammered stoved enamel grey	£2 16 9	£1 0 9
D. HALEY, Longmoor Close, Liverpool, 9.	"Glotherm"	Portable firebar	1 kW	One 1 kW bar	Cream and gold, green and gold and buff	Upon application	
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2.	"Pixie"	Portable reflector	750 W or 1 kW	One 750 W or 1 kW rod	Mushroom, silver or ivory	£1 18 7	£0 14 2
	"Glory"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Green, mushroom or ivory	£2 10 10 (1 kW) £3 12 9 (2 kW)	£0 18 8 (1 kW) £1 6 9 (2 kW)
	"Marilyn"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Mushroom, silver or ivory	£2 3 11 (1 kW) £3 5 7 (2 kW)	£0 16 0 (1 kW) £1 3 11 (2 kW)
	"Elfin"	Portable reflector	1 kW	One 1 kW rod	Ivory	£1 9 3	£0 10 8
HEATRAE, LTD., Heatrae Works, Norwich.	"Saferod"	Reflector, high-level safety	1 kW	One 1 kW rod	Stoved enamel	£3 19 0	£1 8 10



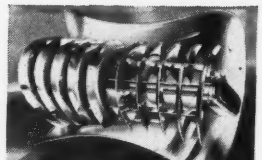
Grafton 2 kW coal effect fire

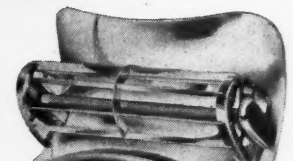
Below: Grafton 750 W coal effect model



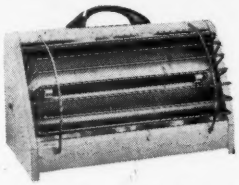


Left: Heatrae "Saferod"

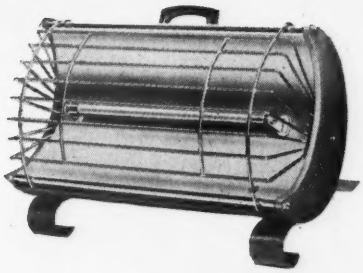


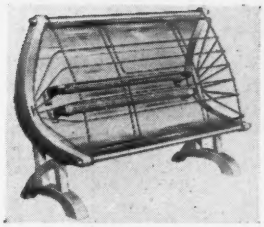


H.M.V. "Lincoln" and (right) H.M.V. "Ely"

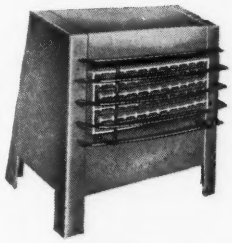


L. G. Hawkins "Elfin" and (right) L. G. Hawkins "Marilyn"

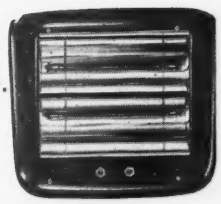




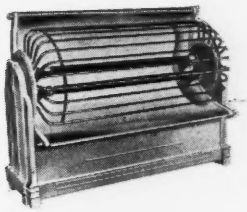
Hotpoint HF.152 2 kW model



Haley "Glotherm"



M.E.M. "Walray"



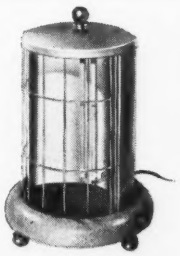
M.E.M. "Memray"

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Fletton, Peterborough.	HF.151	Portable reflector	1 kW	One 1 kW rod	Cream and chromium	£2 15 0	£1 2 0
	HF.152	Portable reflector	2 kW	Two 1 kW rod	Cream and chromium	£3 10 0	£1 5 0
	93	Portable radiant	2 kW	Two 1 kW bar	Mottled cream vitreous enamel	£4 0 0	£1 9 3
C. HOUNSLOW & CO., LTD., Chalex Works, Southwick, Sussex.	"Albemarle" 3008	Imitation fuel	2 kW	Two 1 kW rod	Stoved enamel gold, flecked cream	£7 0 2	£2 11 6
	"Vertic" 3005 and 3006	Portable reflector	1 or 2 kW	One or two 1 kW rod	Pastel cream, copper (3005) and pastel grey, copper (3006)	£1 12 7 (3005) £2 12 6 (3006)	£0 12 0 (3005) £0 19 4 (3006)
	"Standard" 3001 and 3002	Portable reflector	1 or 2 kW	One or two 1 kW bar	Copper bronzed	£1 12 7 (3001) £2 11 9 (3002)	£0 12 0 (3001) £0 19 0 (3002)
	"Standard" 3003 and 3004	Portable reflector	1 or 2 kW	One or two 1 kW rod	Copper bronzed	£2 1 6 (3003) £3 1 5 (3004)	£0 15 3 (3003) £1 2 7 (3004)
MIDLAND ELECTRIC MFG. CO., LTD., M.E.M. Works, Reddings Lane, Birmingham, 11.	"Memray"	Portable, swivelled reflector	1 or 2 kW	One or two 1 kW rod	Bronze or cream	£2 16 0 (1 kW) £4 5 0 (2 kW)	£1 0 6 (1 kW) £1 11 1 (2 kW)
	"Reflex"	Portable, fixed reflector	1 or 2 kW	One or two 1 kW rod	Mushroom or mottled stone	£2 12 0 (1 kW) £4 0 0 (2 kW)	£0 19 0 (1 kW) £1 9 3 (2 kW)
	"Memglo"	Portable flat bar	1 or 2 kW	One or two 1 kW bar	Mottled stone	£2 2 0 (1 kW) £2 19 0 (2 kW)	£0 15 4 (1 kW) £1 1 7 (2 kW)
	"Walray"	Inset reflector	2 kW	Two 1 kW rod	Mushroom or mottled stone	£6 6 0	£2 6 1
	"Walbeam"	Outset flat bar	1 or 2 kW	One or two 1 kW bar	Mushroom or mottled stone	£2 13 0 (1 kW) £4 8 0 (2 kW)	£0 19 5 (1 kW) £1 12 2 (2 kW)
MONARCH ELECTRIC, LTD., Vicarage Road, Lye, Worcs.	"Doric" 501	Portable	1 kW	One 1 kW bar	Hammer enamel	£1 10 6	£0 11 2
	"Doric" 502	Portable	2 kW	Two 1 kW bar	Hammer enamel	£2 8 0	£0 17 6
T. B. MORLEY & CO., LTD., Jameson Street, Hull.	"Morco" bowl	Portable reflector	600 W	One 600 W spiral	Cream	£1 8 6	£0 10 5

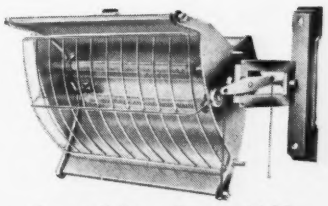
ELECTRIC FIRES . . . . . *continued*

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
T. B. MORLEY & CO., LTD., Jameson Street, Hull. *(continued)*	"Don"	Portable reflector	750 W to 2 kW	One or two 750 W or 1 kW rod	Cream	£2 11 0 (750 W) £2 14 0 (1 kW) £3 3 0 (1½ kW) £3 9 0 (2 kW)	£0 18 9 (750 W) £0 19 10 (1 kW) £1 3 1 (1½ kW) £1 5 4 (2 kW)
	"Humber"	Portable reflector	750 W or 1,500 W	One or two 750 W rod	Cream	£2 12 0 (750 W) £3 3 0 (1½ kW)	£0 19 1 (750 W) £1 3 1 (1½ kW)
	"Derwent"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream	£2 13 0 (1 kW) £3 8 0 (2 kW)	£0 19 5 (1 kW) £1 4 11 (2 kW)
	"Thames"	Portable twin reflector	750 W or 1,500 W	One or two 750 W rod	Bronze	£1 14 6 (750 W) £2 12 6 (1½ kW)	£0 12 8 (750 W) £0 19 3 (1½ kW)
	"Severn"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Bronze	£1 13 0 (1 kW) £2 10 0 (2 kW)	£0 12 1 (1 kW) £0 18 4 (2 kW)
	"Aire"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream	£2 12 0 (1 kW) £3 7 0 (2 kW)	£0 19 1 (1 kW) £1 4 7 (2 kW)
MORPHY-RICHARDS, LTD., 6, Conduit Street, London, W.1.	"Avon" FA/10 and FA/20	Portable reflector	1 kW (FA/10) and 2 kW (FA/20)	One or two 1 kW rod	Beige	£3 10 0 (FA/10) £4 5 0 (FA/20)	£1 5 7 (FA/10) £1 11 1 (FA/20)
	"Cray" FC/750 and FC/15	Portable reflector	750 W (FC/750) and 1½ kW (FC/15)	One or two 750 W rod	Beige	£1 19 6 (FC/750) £2 12 6 (FC/15)	£0 14 5 (FC/750) £0 19 3 (FC/15)
	"Cray" FC/10 and FC/20	Portable reflector	1 kW (FC/10) and 2 kW (FC/20)	One or two 1 kW rod	Beige	£2 5 0 (FC/10) £2 15 0 (FC/20)	£0 16 6 (FC/10) £1 0 2 (FC/20)
MYSTO MAID ELECTRICAL APPLIANCES, Parkfield Road, Birmingham, 8.	"Countess" 1003	Portable reflector	2 kW	Two 1 kW rod	Hammered gold or silver	£8 2 6	£2 19 7
	"Benbow" 1202	Portable reflector	750 W	One 750 W rod	Pastel green or silver	£1 13 6	£0 12 4
	"Mystovector" 1127	Reflector and convector	1 kW	One 1 kW rod	Hammered gold or silver	£3 19 0	£1 9 0
	"Linnet" 1130	Reflector (contemporary styled)	2 kW	Two 1 kW rod	Hammered gold or silver	£3 7 0	£1 4 7
	Bowl 1001 and 1001C	Portable reflector	600 W	One 600 W spiral	Polished copper or chromium	£1 7 6 (copper) £1 11 0 (chrome)	£0 10 1 (copper) £0 11 5 (chrome)
NICO LIGHT ENGINEERING CO., LTD., 1, Laud Street, Croydon.	"Reflecta-Ray" Bowl	Portable reflector	600 W	One 600 W spiral	Ivory or black base	£1 5 0	£0 9 2
PREMIER ELECTRIC HEATERS, Keeley Street, Birmingham, 9.	"Parabain" 5321	Wall mounting reflector	1 kW	One 1 kW rod	Ivory	£3 9 6	£1 5 5
	"Paraglow" 5380/1 and 5390/1	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream and bronze	£2 5 0 (5380/1) £2 15 0 (5390/1)	£0 16 5 (5380/1) £1 0 1 (5390/1)
	"Jewel" 5510/1 and 5520	Portable reflector	1 or 2 kW	One or two 1 kW rod	Green and cream (5510/1) Green (5520)	£1 17 6 (5510/1) £4 10 0 (5520)	£0 13 9 (5510/1) £1 12 11 (5520)
	"Parabeau" 5372G	Portable reflector	2 kW	Two 1 kW rod	Gilt	£5 15 0	£2 2 1
	"Guardian" 5401, 5402 and 5403	Portable reflector	2 kW	Two 1 kW rod	Gold (5401) Pink (5402) Blue (5403)	£6 0 0	£2 3 10
	"Carlton" 5141, 5142 and 5143	Reflector, imitation coal effect	2 kW	Two 1 kW rod	Silver (5141) Copper (5142) Gold (5143)	£12 0 0	£4 7 9
	"Screen Heater"	Radiant heater	1 kW	One 1 kW fused on glass	White and cream	£10 10 0	£3 16 10

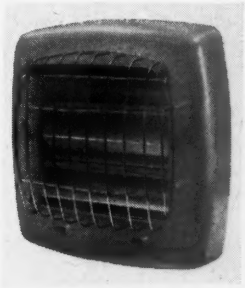
Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
REEVES ELECTRICAL AND RADIO CO., LTD., Reelek Works, Baldock, Herts.	"Champion"	Portable reflector	750 W and 1½ kW	One or two 750 W rod	Cream, silver grey, mushroom, green and blue	£1 0 0 (750 W) £2 0 0 (1½ kW)	£0 7 4 (750 W) £0 14 8 (1½ kW)
	"Popular"	Portable reflector	750 W and 1½ kW	One or two 750 W rod	Cream, silver grey, mushroom, green and blue	£1 5 0 (750 W) £1 15 0 (1½ kW)	£0 9 2 (750 W) £0 12 9 (1½ kW)
	"Minor"	Portable reflector	1 kW	One 1 kW rod	Cream, silver grey, mushroom, green and blue	£1 12 0	£0 11 9
	"Handy"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream, silver grey, mushroom, green and blue	£1 10 0 (1 kW) £2 5 0 (2 kW)	£0 11 0 (1 kW) £0 16 5 (2 kW)
	"Wizard"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream, silver grey, mushroom, green and blue	£2 0 0 (1 kW) £2 10 0 (2 kW)	£0 14 8 (1 kW) £0 18 4 (2 kW)
	"Adjustable"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream, silver grey, mushroom, green and blue	£2 5 0 (1 kW) £2 15 0 (2 kW)	£0 16 5 (1 kW) £1 0 2 (2 kW)
	"Screen"	Portable reflector	750 W or 1 kW	One 750 W or 1 kW rod	Cream, silver grey, mushroom, green and blue	£1 7 6 (750 W) £1 15 0 (1 kW)	£0 10 1 (750 W) £0 12 9 (1 kW)
REVO ELECTRIC CO., LTD., Tipton, Staffs.	"Reflexam" F.14546 and F.14548	Wall mounting reflector	1 or 2 kW	One or two 1 kW rod	Artshade silver and chromium	£3 10 6 (F.14546) £4 15 6 (F.14548)	£1 5 10 (F.14546) £1 15 0 (F.14548)
	"Dolphin" F.13950 and F.13948	Portable firebar	1 or 2 kW	One or two 1 kW bar	Beige	£2 19 0 (F.13950) £4 7 6 (F.13948)	£1 1 7 (F.13950) £1 12 0 (F.13948)

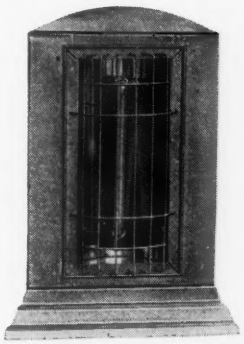


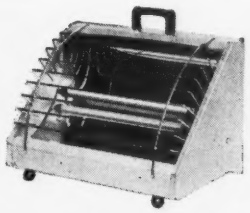
Mysto Maid "Mystovector" and (left) Mysto Maid "Linnet"



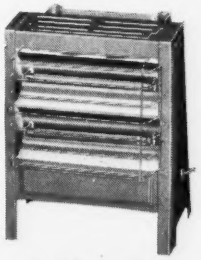
Revo "Reflexam" and (right) Revo outset model



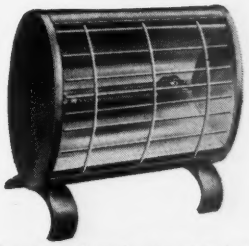




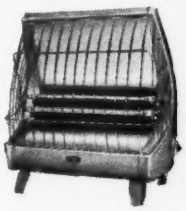
Reeves 1½ kW "Champion" and (left) Reeves 1 kW "Screen" fire

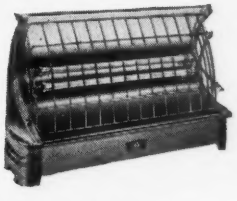


T. B. Morley "Thames"

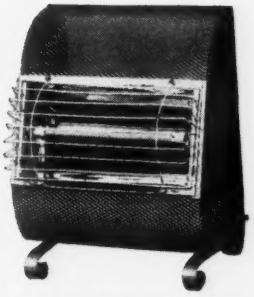


Premier "Guardian" and (below) Premier "Jewel" 2 kW model

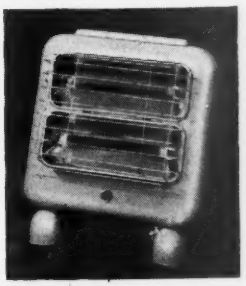




Morphy-Richards FA/20 "Avon" and (right) Morphy-Richards FC/20 "Cray"



Sutcliffe & Clarkson HCR/4 radiant convector



ELECTRIC FIRES . . . . . *continued*

Manufacturer	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
REVO ELECTRIC CO., LTD., Tipton, Staffs. *(continued)*	"Revo-Inset" F.13955 and F.13956	Inset with slabbing frame	1 or 2 kW	One or two 1 kW bar	Green, grey or beige	£2 8 6 (F.13955) £3 17 6 (F.13956)	£0 17 9 (F.13955) £1 8 4 (F.13956)
	"Revo-Inset" F.13957 and F.13958	Inset with slabbing frame	1 or 2 kW	One or two 1 kW rod	Green, grey or beige	£2 8 6 (F.13957) £3 17 6 (F.13958)	£0 17 9 (F.13957) £1 8 4 (F.13958)
	"Revo-Outset" F.14639 and F.14640	Direct wall mounting	1 or 2 kW	One or two 1 kW bar	Green, grey or beige	£2 19 0 (F.14639) £4 5 0 (F.14640)	£1 1 7 (F.14639) £1 11 1 (F.14640)
	"Revo-Outset" F.14549 and F.14550	Direct wall mounting	1 or 2 kW	One or two 1 kW rod	Green, grey or beige	£3 4 0 (F.14549) £4 10 0 (F.14550)	£1 3 5 (F.14549) £1 12 11 (F.14550)
	"Tubula" F.14542 and F.14544	Portable reflector	1 or 2 kW	One or two 1 kW rod	Artshade silver and chromium	£3 7 6 (F.14542) £4 10 0 (F.14544)	£1 4 8 (F.14542) £1 12 11 (F.14544)
SUTCLIFFE & CLARKSON, LTD., Whittlefield Mill, Burnley, Lancs.	HCR/4	Reflector and convector	2 kW	One 1 kW rod one 1 kW (concealed)	Hammered bronze	£5 1 4	£1 18 0
TYM'S ELECTRIC, Systym Works, Kennard Road, London, E.15.	"Sunglo"	Portable	750 W	One 750 W bar	Golden green, golden brown or primrose	£0 18 9	£0 5 6
	"Sunshine"	Portable	750 or 1,000 W	One 750 or 1,000 W rod	Black and gold, black crackle, brown or primrose	£1 4 6	£0 7 7
	"Sunshine"	Portable	1·5 or 2 kW	Two 750 or 1,000 W rod	Black and gold, black crackle, brown or primrose	£1 13 6	£0 11 0
	"Contemporary"	Bowl	650 W	One 650 W spiral	Black crackle and aluminium	£0 19 9	£0 6 0

Marconi House, Newcastle

Personalities in shipping and shipbuilding in the North-East were guests of the Marconi International Marine Communication Co., Ltd., at an inspection of the new Marconi House, Newcastle-upon-Tyne, on 21st and 22nd September. They were welcomed by Mr. D. Dodds, manager of the Newcastle Depot, and Mr. R. A. H. Penny, contracts representative for the area. Sir Noel Ashbridge, a director of the Marconi Marine Co., Mr. R. Ferguson, the general manager, and Mr. T. A. Simpson, deputy general manager, were also present to meet visitors on 21st September.

Radar scanners, d.f. loop and aerials on the roof of the new Marconi House, Newcastle

The new Marconi House supersedes the old premises in Pudding Chare, off Collingwood Street. It is on a site between Melbourne Street and Pandon Bank. On the flat roof are two radar scanners, the twin-loop aerial of a direction-finder, and an array of transmitting, receiving and v.h.f. aerials. The ground floor houses a well-equipped test and repair shop and paint-spraying room, as well as capacious stores for light equipment and stationery, with storekeeper's office and ledger office.

The repair shop has power and aerial points which provide four independent working positions. The first floor, reached by a staircase from the main entrance hall in Melbourne Street, contains the executive and administrative section of the depot. There is also a display room where the latest Marconi Marine products are on view, and where two radar sets show radar "pictures" of the area around Marconi House.

Accommodation is also provided in the new building for the Newcastle offices of two of the Marconi Marine Co.'s associates, the English Electric Co., Ltd., and Marconi Instruments, Ltd.

Industrial Radiology

The Society of Industrial Radiology and Allied Methods of Non-Destructive Testing commences its winter programme during October. This Society, which was founded at the close of last year, and now has a membership of over 200, is the first professional body, in this country, endeavouring to co-ordinate all specialists employed in the various methods of non-destructive testing. Its chief concern is to establish and maintain a high standard of technical practice and to facilitate the exchange of information and ideas on matters concerning these rapidly expanding methods of inspection. Monthly meetings have been arranged by the branches of the Society at London, Birmingham, Sheffield and Glasgow. Particulars of the Society's activities are obtainable from the hon. secretary, Mr. D. N. Laurie, 2, Tomswood Terrace, Barkingside, Essex.

PUBLIC LIGHTING AFFAIRS

Proceedings at the A.P.L.E. Conference at Folkestone

IN our last issue we published summaries of Mr. J. M. Waldram's presidential address and the papers presented at the annual conference of the Association of Public Lighting Engineers at Folkestone last week, together with a survey of the exhibition of street lighting equipment held in conjunction with the conference.

At the opening session on 13th September at the Leas Cliff Hall the Mayor of Folkestone, Councillor T. L. E. Franks, J.P., extended the customary civic welcome and reminded the assembly that the last A.P.L.E. annual conference held in Folkestone was in 1937. He said that the number attending the present conference (about 1,800) was nearly twice the number participating on the last occasion.

Following the Mayor's welcome Mr. Waldram was inducted as president by the retiring president, Mr. L. A. Doxey. An illuminated address was presented by Mr. Doxey to Mr. H. C. Brown to mark the completion of 25 years of service to the Association. Mr. H. Carpenter, M.I.E.E., who is responsible for the Blackpool illuminations, was elected vice-chairman.

Mr. Waldram then delivered his address which was followed by the official opening and inspection of the exhibition by the Mayor, in company with the president.

In the afternoon Mr. Granville Berry, M.I.C.E., city engineer and surveyor, Coventry, and Mr. W. H. Shaw, Associate I.E.E., lighting engineer, Coventry, presented their paper "Local Authorities and Public Lighting" and in the ensuing discussion Mr. N. L. Staniforth (Dagenham) said he agreed with the authors that there were too many lighting authorities. He also accepted, with reservations, that many lacked the funds to carry out increasingly urgent works. Many authorities were apathetic, and he suggested that a diversity of more than 500 per cent in the public lighting rates for county and municipal boroughs was not an advertisement for the efficiency of public lighting administration. Grants should be retrospective, otherwise authorities which had relighted classified roads since the war would find themselves subsidizing their less energetic neighbours. The large degree of autonomy of Area Boards led to varying charges, especially in the case of service lines, a fact which irritated local authorities.

The Mayor of Folkestone and the president at the official opening of the exhibition

Before inducting the new president to office Mr. L. A. Doxey introduces the Mayor of Folkestone

Mr. A. E. Marchant, M.Sc.Tech. (London Electricity Board) supported the plea in the paper for an extension of lighting from 11 p.m. to dawn, particularly on main traffic routes.

Mr. J. Wilson (Paisley) said that in seeking financial assistance for public lighting from the Treasury, local authorities should be careful to maintain the privileges and powers which they possessed at present.

Mr. H. V. Overfield, B.Sc. (Scarborough) spoke of a mile of trunk road between Scarborough and a housing neighbourhood for which lighting could not be obtained under the present administration. Mr. D. S. Young (Corporation of the City of London) urged that subways should be amply lighted to encourage their use for the purpose of reducing accidents and improving traffic flow on the roads.

Councillor J. Ireland (Brighton) said that Brighton's streets were lighted all night, one of the lanterns of the double lantern standards on the front and two of the three lamps on standards in the main thoroughfares being turned out at midnight. Mr. G. G. Marsland, M.B.E., B.Sc. (Cheltenham) spoke of the value of the lighting of public buildings and parks.

Mr. W. Robinson (E.D.A.) referred to the high rate of road accidents this year and feared that it would continue to rise. He hoped that there would emerge from the conference a definite manifesto and expression of opinion from the country as a whole to guide the Minister of Transport in his future activities.

Mr. Eric Bates (Eastern Electricity Board) said that if all other charges were divorced from it, the price of electricity over the whole country for lighting lay within a narrow band, the variation being relative to the cost of producing electricity in various parts of the country, and that depended mainly on the cost of coal in the area.

Mr. C. R. Bicknell (Siemens Electric Lamps and Supplies) said that the Association was concerned with many more facets of lighting than street lighting, a fact which had rather been lost sight of.

Mr. E. C. Lennox, M.I.E.E., F.I.E.S., in proposing a vote of thanks to the authors, said he hoped that the paper

would assist in arousing public and Parliamentary awareness of the fact that good street lighting on populated traffic routes was necessary in the interests of national economy, convenience and life, and that the Minister of Transport would be able to supplement his views by legislation to enable public lighting to be provided and maintained wherever necessary.

Tuesday's proceedings were concluded in the evening by a most successful reception at the Leas Cliff Hall by the Mayor and Mayoress of Folkestone.

Although it seemed that at all non-session times throughout the conference the exhibition was extremely well patronized delegates, members and visitors turned out in force for the conference session at the exhibition on the Wednesday morning.

The annual luncheon of the Association was, however, the principal event on Wednesday. Mr. Waldram took the chair and the guests of honour were the Mayor of Folkestone and Dr. J. W. T. Walsh, O.B.E., M.A., president of the International Commission on Illumination.

Mr. H. Carpenter, M.I.E.E., vice-president, proposed the toast of "The County Borough of Folkestone and the Guests." He thanked the Mayor of Folkestone and his officials for what they had done to ensure a smooth-working and happy conference, and welcomed the guests, particularly the delegates from France, Belgium, Holland, South Africa, New Zealand, Trinidad, Malaya and Israel.

The Mayor, responding to the toast, referred to the work of Mr. H. Carpenter as the illuminations and public lighting officer of Blackpool.

Dr. J. W. T. Walsh proposed the toast of the Association. He expressed the appreciation of both the national and the international organizations concerned with lighting in general for the very active support which the Association gave them, and he referred particularly to the report on street lighting prepared by Mr. Waldram on behalf of the British National Committee for the C.I.E. meeting in Zurich during the summer.

The president, responding, said it was indicative of the health of the Association that this year it had the biggest exhibition and biggest attendance ever. Members could take courage from that and from the fact that there was still plenty of work to do.

On Wednesday afternoon the general assembly was split into parties who enjoyed to the full alternative coach tours and visits to the Silver City Airways, Ferryfield Airport; the Dover Harbour Board's new Car Ferry Terminal; and to Dover Castle. There was a mannequin parade for the ladies at Bobby's stores, Folkestone, in the evening.

Secondary Roads

Thursday's proceedings opened with the reading of the paper "The Code of Practice for the Lighting of Roads other than Traffic Routes," by Dr. J. W. T. Walsh, and this provoked a vigorous and lengthy discussion.

Mr. A. W. Christie, M.A., B.Sc. (Road Research Laboratory, D.S.I.R.), said that the Departmental Committee recommended that the mounting height for Group B roads should be considerably lower than that for Group A roads to indicate to drivers that they should use their headlamps when necessary. The Highway Code said "After dark do not rely on sidelights in built-up areas unless the street lighting is good," but it said nothing about Group A or Group B street lighting and did not mention mounting heights. It was clear that the limitation on the Group B mounting height was not serving the purpose originally envisaged. There must be a very good reason for limiting the standard of lighting which could be employed on any road, and in the present case he did not think the reasons that were given were good enough.

The new president decorates Mr. L. A. Doxey with the past-president's badge

Mr. H. Carpenter, M.I.E.E. (Blackpool), vice-president, said he advocated not an intermediate standard of lighting but extending the upper limit of the Group B mounting height by 3ft. With modern lantern efficiency and spacing the lower limit of flux of 600 lumens was far too low; it should be about 800.

Mr. F. J. Cave, B.Sc. (Northampton), said that his authority had come to the conclusion that intermediate standards of lighting with which they had experimented were not satisfactory and they could not see any way of making them satisfactory. The additional cost of the intermediate standard of lighting would not be justified because it would be something which did not satisfy anybody. Northampton had provided satisfactory Group B lighting at a mounting height of 13ft and could not see the advantage of the extra 2ft.

Mr. C. C. Smith, M.I.E.E., F.I.E.S. (Liverpool), said the lower mounting height tolerance seemed to be unnecessary because if 15ft was found to be impracticable a lower height would be adopted whatever the Code said.

Mr. E. H. Jesty (London Electricity Board) suggested that much malicious damage could be avoided, while equally good lighting could be obtained, by increasing the mounting height.

Mr. Brodie (Ayr) thought that because there were always people with special problems the Code of Practice Committee should retain the recommended mounting heights.

Mr. H. F. Cork, A.M.I.E.E. (Manchester), said that the principal users of minor traffic routes were bus drivers who, with a 15ft mounting height suffered from glare as they sat 7ft above the road level. Manchester had many installations on such routes at a height of 20ft and there the bus drivers did not suffer from glare. An intermediate light source installation could mean a saving of 40 per cent in both capital and running costs.

Mr. J. H. Morrison (Bolton) contended that the luminous flux should be at least 1,000 or 1,500 lumens.

Mr. F. H. Pulvermacher (South Wales Electricity Board) said that many villages had lamps attached to the poles of overhead supply lines spaced about 150ft apart. Were they to have underground cables and concrete or steel columns, or were they to be allowed special consideration?

Mr. C. W. Steedman (Wembley) thought the lower limit of 600 lumens for Group B lighting was far too low. In urban areas the endeavour should be to make all roads, whether through traffic roads or district roads, capable of

being used by a reasonable motorist without the need for headlights. For that purpose 1,500 lumens was required.

Mr. J. G. Holmes (Holophane, Ltd.) said that street lighting engineers should encourage the use of safe vehicle lights, and on roads other than Group A motorists should be encouraged to use headlights, dipped as a matter of courtesy and safety.

Mr. J. M. Ward (Glasgow) considered that public lighting engineers had a duty to give the maximum of light to everybody, not only to motorists but also to pedestrians in their residential areas. After getting rid of their gas lamps Glasgow would clear out anything in the nature of Group B lighting.

Mr. J. Clapp, B.Sc. (Camberwell), said it had been emphasized that the intention was to provide not a specification but a code of practice, and the very fact that such a wide lumens output was given meant that it was left to the lighting engineer to decide what lantern should be adopted.

Lt.-Comdr. E. J. Cook (North Western Electricity Board) said that if a mounting height of 20ft could be tolerated, parish councils which could attach lanterns to distribution poles could have many more lights.

Dr. Walsh, in reply, also stressed that they were dealing with a code of practice and not a specification. He said the Committee tried to draw up a document which would give lighting engineers guidance, and did not, could not, and would not wish to, attempt to take away from the lighting engineer any initiative and the use of his experience in lighting his roads. It was now impossible to recognize as good street lighting any installation with a spacing of 150ft. The endeavour should be to reduce the spacing while retaining the mounting height.

Tree-Lined Roads

At the afternoon session on Thursday Messrs. H. M. Ferguson, M.I.E.E., and W. R. Stevens, B.Sc., M.I.E.E., presented their paper "The Lighting of Tree-Lined Roads."

Opening the discussion, Mr. G. Small (East Midlands Electricity Board) said it seemed a retrograde step to advocate an amount of light either below or very little above the absolute minimum recommended in Part 2 of the Code.

Mr. I. A. MacDonald (East Midlands E.B.) said that the experimental lanterns described relied enormously on the precise positioning of the light source and the lantern.

Dr. Walsh suggested that it would be fairly easy for lighting engineers to experiment on the best form of distribution for a particular road by using posts each equipped with two lanterns axially asymmetrical—one at a maximum axis of 30 deg with the road in one direction and the other at an axis of 30 deg with the road in the other direction.

Mr. L. Foale (Torquay) described an installation in his borough where lanterns were employed on brackets fixed to trees growing in the carriageway close to the channels. Mr. L. R. Osgood (Luton) said there was a sentimental attitude towards trees; if trees were in the way of the lighting they should be cut back.

The president thought that no one amenity should claim precedence over others. The roads had to be used, had to be beautiful and had to be lighted, and all those things must be worked in. Councillor J. Ireland (Brighton) said the only solution seemed to be to put the lighting standards in the centre of the road.

Mr. Stevens, in reply, said there would be no difficulty in producing good lanterns which would emit five or ten times as much light as anybody could at present afford, and he was sure that in due course light quantities of that order would be used. Where possible, lighting over the centre of the road seemed to be the common-sense method. Public lighting progress would be arrested by any attempt to limit the precision of lanterns, and lighting engineers should be prepared for more complex pieces of apparatus.

Many of the ladies attending the conference took part in a coach tour to Canterbury on the Thursday afternoon, while in the evening there was a turn out in force for the reception by the president and Mrs. Waldram.

Centralized Control

Friday morning's session was the last of the conference and Mr. J. F. Mackenzie delivered his paper "The Centralized Control of Street Lighting." Opening the discussion on this paper, Mr. H. Lloyd-Williams, D.S.O., V.R.D., B.Sc. (London Electricity Board) expressed the view that centralized control systems, being very costly, ought to be financed on a national basis. The case for central control was concerned chiefly with the need to ameliorate conditions when darkness and fog occurred outside the normally accepted lighting hours, delaying traffic and resulting in a heavy blow at industry and life. He suggested that the cost of centralized control ought to be reckoned against its worth in terms of continuing the flow of traffic on an industrial basis. Efforts should also be made to devise new apparatus able to deal on a broader basis with the requirements of the future. In that connection, radio control might provide a solution. He hoped that the Post Office would allocate more wavelengths to public authorities for such purposes.

Mr. F. Akister (East Midlands E.B.) said he was concerned with the operation of the first ripple control system installed in Britain at Bletchley 18 years ago; the spillover problem, although he knew it could be cured, was still present. His authority had recently taken a new supply direct from the grid. The lighting was switched on at the new substation, but ten minutes later the lights went out, and where the signal was repeated the lights came on again. Later, it was found that the "on" signal of a town 20 miles away corresponded to Bletchley's "off" signal.

Mr. W. P. Kerrigan (Dublin) gave details of the subcentralized system of control in Dublin City by means of which, he stated, h.v. signalling was achieved at the cost of l.v. injection equipment. He also gave particulars of tests carried out in the centre of Ireland as a result of which, apart from the relays, ripple signals were measured at the following distances from the injection point: 2·5 V at 20 miles; 1·25 V at 16 miles; 2·5 V at 10·5 miles; and 2·75 V at 15 miles.

Mr. E. P. Burdett, M.A. (Eastern E.B.) said the difficulties of making an economic case for ripple control could only be overcome by making every possible use of the system for other purposes.

The president described an experiment carried out during the war at the instance of the Prime Minister which involved switching the lights of a whole town on together for 10 seconds to see the effect.

Mr. Mackenzie, in reply, said that Mr. Akister had the oldest ripple control system in the country, and since its installation there had been developments in maintenance, etc., probably at Mr. Akister's expense. What the effect of re-linkage would be was not known when the Bletchley system was installed. The spillover problem had been solved by using uniform signals in order to avoid interference. Manufacturers were seriously concerned about the C.E.A.'s policy not to adopt load control by means of a ripple system; the manufacture of the equipment might cease when overseas requirements had been satisfied unless by that time the C.E.A. had altered its mind.

The president announced that next year's conference would be held at Blackpool.

Financial Section

STOCKS and SHARES

IN the electrical markets of the Stock Exchange the principal event of the past week was the English Electric Company's announcement of a "rights" issue of ordinary shares to raise something over £11 million of fresh capital. Market reactions to news of this sort have gone into reverse since the change in investment sentiment, about two months ago, from confidence to caution. In the earlier mood, there would have been enthusiastic buying of existing shares carrying rights to apply for a new issue at a price attractively below the market level. At present, by contrast, the accent is placed on the possibility of temporary depression due to the sale of rights by shareholders unable, or unwilling, to subscribe for new shares during unsettled market conditions. In the case of this English Electric announcement, the initial result was a fall of some 5s in the price of the shares immediately concerned to 72s 6d (they have been as high as 86s 9d this year) and a sympathetic reaction in the shares of the other big electrical engineering groups.

English Electric Issue

Allotment letters are expected to go out this week-end to holders of English Electric ordinary stock, offering them one new £1 share at 60s for every three £1 units held. The group's bank indebtedness has risen to £13·4 million, and a statement from the chairman says that additional money is needed both for working capital and for new manufacturing and research facilities. He reports a remarkable increase in turnover, with every indication of further growth to come, and estimates that if trading conditions remain as they are, profits this year should be ample to cover a final dividend, on the increased capital, at the same rate as before. On the basis of a total of 12½ per cent, the yield on the shares, at an "ex-rights" price of say 70s, would be a little over 3½ per cent. English Electric's last capital issues were in 1953, when some £6½ million was raised by offers of ordinary shares and debenture stock.

Price Movements

The fall in the price of English Electrics pulled back A.E.I. and General Electrics by 1s or so; market prices were below the Stock Exchange Official List quotations given in the accompanying tables. The latter again reflect a good deal of irregularity in the movement of prices, but the gains have a majority over the losses. One of the week's most notable changes was a jump of 5s 6d, to 25s, in Hall Telephones; this followed the meeting at which approval was given to capital increases and the acquisition of the firm of James Gordon & Co., the automation specialists. An advance of 5s in Tube Investments marked a rise of interest in the coming results for the financial year now ending. Many gains of about 1s were

The Week's Price Changes

Company or Board	Nom. Value	Middle price 19th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1955 Highest	1955 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	77⅛	+1	3	3	3 17 6	94⅞	76⅛
Brit. Elec. 1974/77	100	76⅛	+1	3	3	3 18 6	93⅞	75⅛
Brit. Elec. 1976/79	100	81⅛	+1	3⅜	3⅜	4 6 0	98⅜	80⅛
Brit. Elec. 1974/79	100	90⅛		4½	4½	4 14 0	109	90⅛
Overseas Electric Supply								
Calcutta Elec.	£1	22/6		6†	6†	5 6 9	22/6	20/9
East African Power	£1	22/6		7	7	6 4 6	24/6	19/9
Nigerian Elec.	£1	22/-		10	10	9 1 9	27/-	22/-
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	22/9	21/-
Perak Hydro-Elec.	£1	20/-		6	10	10 0 0	21/6	17/9
Equipment and Manufacturing								
Aberdare Cables	5/-	12/-	−3d	12½	17½	—	14/6	11/-
Aerialite	1/-	6/6		88½	88½	—	6/7	5/3
Allen, W. H.	£1	77/6		20	20	5 3 3	83/9	77/-
Aron Elec. Ord.	£1	57/6		15	15	5 4 3	63/9	55/6
Assoc. Elec. Ord.	£1	85/-	−1/3	11½	14	3 6 0	96/-	62/6
Automatic Tel. & El.	£1	65/-		15	15*	4 12 3	79/6	65/-
Babcock & Wilcox	£1	85/-	+1/3	12*	15	3 10 6	98/-	68/6
Baldwin, H. J.	2/-	4/6	−3d	20	20	8 17 9	5/6	4/4
Bakelite	10/-	32/6		12½	16	4 18 6	34/6	27/-
British Aluminium	£1	53/3	+1/9	10	12	4 10 3	58/-	35/3
B.I. Callender's	£1	46/-	+1/-	10	10	4 7 0	55/3	44/9
B.I. Callender's 6% Pref.	£1	21/9		6	6	5 10 3	26/6	21/9
British Thermostat	5/-	31/3		27½	27½	4 8 0	35/-	22/6
British Vac. Cleaner	5/-	7/6		25	30	—	10/-	7/-
Brook Motors	10/-	46/3		20	20*	4 6 6	46/3	39/9
Brush Ord.	5/-	8/6		6	10	5 17 9	9/6	7/7
Bulgin, A. F.	1/-	7/3	+3d	30	45	6 4 3	8/-	4/-
Burco Dean	5/-	13/9	+6d	—	—	—	17/3	13/3
Chloride El. Storage	£1	67/6		12½	17½	5 3 8	77/6	58/6
Clarke Chapman	£1	100/-		20	20*	4 0 0	102/6	68/9
Cole, E. K.	5/-	22/9		27½	17½*	3 17 0	25/6	18/3
Cossor, A. C.	5/-	10/9		10	15	6 19 6	14/-	8/9
Crabtree	10/-	29/-	−6d	17½	20	6 18 0	34/6	29/-
Crompton Parkinson Ord.	5/-	16/-	−6d	20	20	—	19/9	16/-
De La Rue	5/-	20/-	−6d	20	30	7 19 0	26/-	18/9
Decca	4/-	41/3		35	56¼*	—	48/9	31/-
Desoutter	5/-	33/9		20	25	3 14 0	35/-	25/6
Dewhurst	2/-	10/-		19	24	4 16 0	10/6	7/3
Dictograph Tel.	2/-	7/6		20	20	5 6 8	9/3	6/6
Dubilier Condenser	1/-	4/3		25	25*	5 17 9	5/7	3/10
E.M.I.	10/-	28/9	+2/3	8	10	3 9 7	37/-	25/3
Electrical Components	5/-	18/9		20	25	6 13 4	21/3	15/3
Elec. Construction	£1	32/6		15	8½*	5 4 6	41/3	31/6
Enfield Cable Ord.	£1	21/3		Nil	Nil	Nil	25/3	20/-
English Electric	£1	72/6	−5/-	10	12½	—	86/9	54/3
English Electric 3¾% Pref.	£1	14/-		3¾	3¾	5 7 3	16/9	14/-
Ericsson Tel.	5/-	41/6	+1/-	25†	20†*	2 8 3†	46/6	29/-
Ever Ready	5/-	32/3	+1/-	40	35*	5 8 6	38/-	22/3
Falk Stadelmann	£1	43/9	−3d	15	15	6 16 4	52/6	42/-
G.E.C. Ord.	£1	65/-	−1/3	12½	14	4 6 3	80/3	51/3
G.E.C. 6½% Pref.	£1	23/9		6½	6½	5 9 5	28/4	23/6
General Cables	5/-	15/3		30	30	9 16 9	17/-	15/-
Greenwood & Batley	£1	52/6	−3/6	17½	17½	6 13 4	57/6	52/6
Hackbridge Cable	5/-	21/3	+6d	20	25	5 17 8	22/6	14/-
Hackbridge & Hewittic	5/-	21/3	+9d	25	30	—	24/9	17/-
Hall Tel. Acc.	10/-	25/-	+5/6	10	10	4 0 0	25/-	11/-
Heatrae	2/-	5/-		12½	15	6 0 0	5/9	4/3
Henley's	10/-	17/3	+9d	10½	10½	6 1 9	21/3	16/6
Holophane	5/-	16/3		20	25	7 13 9	19/9	16/-

* After scrip issue. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

recorded, but the general tone could still be described only as uncertain.

T.C. & M. Progress

Telegraph Construction & Maintenance £1 shares have been relatively steady this month on the strength of the statement which accompanied the declaration of the interim dividend of 3¾ per cent (as before) for the current year. For the first six months of it, production and earnings of the group were reported to show a satisfactory increase over those for the corresponding period of a year ago. With orders on hand at a good level, trading prospects for the rest of the year were regarded favourably. The latest interim payment does not go to the issue of nearly a million new ordinary shares made last July, but these will qualify for the final distribution. In the light of the interim report, market expectations look for a repetition of the 3¾ per cent final dividend, supplemented by 1 per cent bonus, distributed on each of the last three occasions.

in Electrical Investments

Company or Board	Nom. Value	Middle price 19th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1955 Highest	1955 Lowest
Equipment and Manufacturing—continued								
Hoover	5/-	43/-	+1/-	45	70	8 2 9	52/6	40/-
I.C.I.	£1	50/9	−6d	15	10*	3 18 9	61/9	38/3
Intl. Combustion	5/-	19/-		20	25	—	24/6	16/3
Johnson & Phillips	£1	43/3		15	15	6 18 9	52/6	41/-
Lancashire Dynamo	£1	52/6		14	15	—	56/3	37/3
Laurence, Scott	5/-	18/-		20	12½*	3 9 0	19/6	14/6
Lister, R. A.	£1	32/6		12	9·3*	5 14 6	40/-	30/6
London Elec. Wire	£1	52/-	+9d	10	12½	4 16 2	61/3	50/6
Lucas, J.	£1	46/3		10·8	7½*	3 4 9	56/6	41/6
Marryat & Scott	2/-	12/3		25	30	4 18 0	13/-	9/6
Mather & Platt	£1	65/6	+1/-	15	13·4*	—	75/-	48/-
Metal Industries	£1	27/9	+1/3	9	9	6 9 9	38/-	26/6
Midland Elec. Mfg.	£1	50/-		15	10*	4 0 0	55/-	44/-
Morphy-Richards	4/-	28/9	−1/3	40	35*	4 15 2	35/-	27/-
Murex	£1	62/-	+9d	15	15	4 16 9	66/-	49/3
Newman Ind.	2/-	2/9		10	10	7 5 6	3/6	2/4
Oldham & Son	1/-	2/9		17½	20	—	3/6	2/1
Parnall (Yate)	5/-	9/6	+6d	8	14	7 7 3	13/2	7/3
Parsons, C. A.	£1	86/3		7½	10	2 6 6	100/-	56/-
Plessey	10/-	75/6	+6d	30	20*	2 13 0	89/-	57/6
Pye Deferred	5/-	42/6	+1/3	20	12½*	2 18 10	47/6	28/6
Revo	10/-	13/9		27½	9*	6 11 0	15/6	12/6
Reyrolle	£1	105/-		13¾	15	2 17 3	127/6	89/-
Rheostatic	4/-	12/9		20	22½	—	14/3	9/3
Richardsons Westgarth	5/-	16/-		15	16¾	—	19/-	11/-
Scottish Cables	4/-	18/9		27½	27½	5 17 3	22/6	18/9
Smith (England), S.	4/-	16/6		15	17½	4 4 9	20/-	15/-
Southern Areas	£1	32/6		7½	10	6 3 0	38/-	27/6
Strand Elec.	5/-	8/9		17½	15*	8 11 6	13/3	8/6
Sturtevant	5/-	31/3		18·9	14·4†*	2 6 0†	35/9	21/-
Sun. Elec.	£1	35/-		15	15	8 11 6	35/-	33/9
Switchgear & Cowans	5/-	13/9		10	20	7 5 6	17/-	11/-
Taylor Tunnicliff	5/-	13/9		12½	15	5 9 0	16/3	11/3
T.C.C.	10/-	51/3		30	25*	4 17 6	53/9	41/-
T.C. & M.	£1	33/-	+6d	8½	8½	5 3 0	40/9	32/-
Telephone Mfg.	5/-	10/6		10	10	4 15 3	11/6	9/3
Thorn Elec.	5/-	25/3	+1/9	20	15*	2 19 6	33/-	13/9
Thornycroft	£1	42/6	+2/6	15	15	—	47/6	34/6
Tube Investments	£1	97/6	+5/-	15	17½	3 11 9	107/6	72/6
Vactric	5/-	17/6		10	15*	4 5 9	22/-	12/-
Veritys	5/-	12/3	+1/3	12½	12½	5 2 0	12/3	7/-
Walsall Conduits	4/-	14/6		70	70	—	17/3	12/-
Ward & Goldstone	5/-	33/9	+1/3	50	30*	4 9 0	45/-	32/6
Watford	2/-	8/-		22½	25	—	8/9	6/3
Westinghouse Brake	£1	95/3	+1/3	16	18	3 15 6	110/-	82/-
West, Allen	5/-	13/9	+6d	17½	15*	5 9 1	16/6	8/-
Wolf Electric	5/-	20/-		17½	20	5 0 0	21/-	16/1
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A. Ord.	100	69½	+2	6	6	8 12 9	88	67½
Ord.	100	45		3¾	3¾	8 6 8	54½	45
Anglo-Portuguese	£1	24/6	+6d	8	8	6 10 9	27/-	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	20/6	+6d	50	22½*	5 9 9	24/3	19/6
Cable & Wireless:								
Ord.	£1	44/6	−6d	9	10	4 10 0	54/-	39/6
4% Loan	100	92½		4	4	4 6 6	100/-	92
Calcutta Trams	£1	26/3	+3d	6†	7½†	5 14 3†	26/3	20/-
Cape Elec. Trams	£1	18/9	−3d	5½	7½	8 0 0	19/6	16/6
Marconi Marine	£1	35/-		10	10	5 14 3	41/3	33/-
Oriental Tel. Ord.	1/-	75/-	+1/3	16	—	—	102/6	72/6
Telephone Rentals	5/-	11/9	+3d	10	12½	5 6 6	13/6	9/6

Murphy Capital

Effects of a prospective "rights" issue of shares in the present state of markets were apparent in the marking down of Murphy Radio 5s shares to 17s 9d in advance of the offer. This invites shareholders to subscribe for three new shares, at 13s each, for every ten held. Dealings in the new shares were expected to begin on Wednesday of this week. For last year, Murphy raised the dividend from 15 to 20 per cent, from earnings equivalent to 40 per cent on the £700,000 ordinary capital.

Pye and I.T.A.

Pye 5s deferred shares came into favour after the annual meeting. Mr. C. O. Stanley was glad to be able to tell shareholders that the company was identified with the beginning of the alternative TV service, and substantially interested in one of the programme contracting companies. He regarded this new service as a great step forward. On the radio side, he was convinced that "Hi-Fi" would figure prominently in the group's trading this year. It is evidently in the general field of electronics, however, that he sees the biggest opportunities for expansion. Approval was given, at an earlier meeting, to the proposal for a scrip issue of one "A" deferred share for every deferred or "A" deferred share held. All classes of the shares rank for the 12½ per cent dividend declared for the year to March last, when earnings covered fully five times over the amount of the distribution.

Further Issues

Richardsons Westgarth is another company raising additional capital by the offer of new shares to existing holders on bonus terms. About a million in cash will be produced by the offer of shares at 12s 6d, on a one-for-five basis. After allowing approximately for the value of the rights, and taking the company's estimate of a dividend for the year at the same rate as before, the prospective yield is 5½ per cent. Strand Electric Holdings 5s shares are now quoted ex the 50 per cent scrip issue. A dividend of 15 per cent is to be paid on the capital so increased, and on this rate the return from the shares at 8s 9d is 8½ per cent.

REPORTS and DIVIDENDS

The Sterling Cable Co., Ltd.—The annual meeting was held on 15th September, when Mr. J. S. Clark (chairman and managing director) presided. In his circulated statement, the chairman said that new types of cable being manufactured were rapidly gaining in favour and they had been encouraged to build a new factory to accommodate their production. This factory would be in production before the end of the year. It was their intention to replace much of the older plant over the next three years. The greater portion of their output was sold overseas and the response of important undertakings in Canada to their new types had been particularly gratifying. The uncertain supply and price instability of raw materials, particularly copper, caused them constant anxiety, and resulted in the carrying of larger stocks than would be necessary under more stable conditions. A recent move on the part of one of the larger producers of refined copper to stabilize the price of the metal reflected their fears that the present inflated price would encourage the use of aluminium in fields where copper had so far reigned undisputed. That was certainly the tendency now in the industry. Many of the old fears associated with the use of aluminium had been dispelled, and its suitability was now accepted in a much wider range of cables.

The English Electric Co., Ltd.—Particulars were announced last week of a rights issue of ordinary shares to raise over £11 million of new capital. Ordinary stockholders will be allotted one new £1 ordinary share for every £3 nominal of ordinary stock at 60s per share. In making the announcement, Sir George Nelson, Bt. (chairman), says that there has been a remarkable increase in the group turnover, with every indication of further growth during the next few years, since the company last raised fresh capital in 1953. At 7th September last, the group's bank indebtedness was £13,431,000, and Sir George says that the new money is required both for working capital and for the provision of additional manufacturing and research facilities. If trading conditions remain as they are, he says that profits for 1955 should be amply sufficient to cover the final dividend at the 1954 rate on the increased capital.

Richardsons, Westgarth & Co., Ltd., are to make an issue of 1,665,488 5s ordinary shares at 12s 6d each. Ordinary stockholders will be offered 1,415,488 of the shares in the proportion of one for five, and the remaining 250,000 shares will be offered to employees at the same price of 12s 6d. Any employee over 21 will be able to apply for any number of shares subject to scaling down should the total employee applications run to over the 250,000 figure. Should it happen that employees become liable to income tax based on the difference between issue price and market price, the company will, as an encouragement to employees to become shareholders, pay any such tax up to standard rate on a maximum of 1,000 shares for any one employee. The proceeds of the issue will be spent on capital equipment in order to maintain the works plant to modern standards and to provide additional facilities in the way of buildings and machine tools needed to enable the company to make the larger plants now being required by customers. The new capital will not rank for the interim dividend. The final dividend for the year is expected to be at such a rate as with the interim dividend will maintain the 10d per unit paid for the year to March last.

Kenya Power Co.—Of the £4,000,000 5½ per cent debenture stock issue at a price of 101 available for subscription by the public, it is stated that the underwriters will be called upon to take up a very substantial amount.

The West London & Provincial Electrical & General Trust, Ltd., has obtained permission from the Capital Issues Committee for an issue of 79,200 £1 ordinary shares at 30s each. The new shares will be offered to ordinary stockholders on the basis of one for every £3 of ordinary stock held.

Telephone Properties, Ltd.—Consent has been obtained from the Capital Issues Committee to the capitalization of £408,533 of reserves and it is proposed to issue to ordinary stockholders three new ordinary shares of £1 each for every £2 of ordinary stock held. The directors have transferred £328,533 to capital reserve out of the provision for diminution of value of investments, bringing the capital reserve up to £478,533. As there are not enough ordinary shares in the capital of the company for the purpose of the above capitalization, the directors propose that the authorized capital be increased from £900,000 to £1,150,000 by the creation of 250,000 £1 ordinary shares. The directors state that the prospects for the current year continue to be favourable and it is anticipated that the dividend on the increased capital for the current year will not be less than 8 per cent, which is equal to the dividend of 20 per cent declared for 1954.

James Howden & Co., Ltd.—The group profit for the year ended 30th April last is £1,015,779, as compared with £804,283 for 1953-54, and after providing £503,302 for taxation, the net balance is £633,640 (against £390,999), of which £487,672 is dealt with in the accounts of the parent company. It is proposed to pay a final ordinary dividend of 20 per cent, making 25 per cent for the year. For the previous year an interim dividend of 7½ per cent was paid on capital of £546,000 and was followed by a final payment of 15 per cent on the present capital of £1,092,000 as doubled by a one-for-one scrip issue. General reserve receives £266,000.

Berry's Electric, Ltd., reports a trading profit of £128,653 for the year ended 31st March last, as compared with £61,051 for 1953-54, and after meeting all charges, including £63,446 for taxation, the net balance is £69,008 (against £30,361). It is proposed to pay a final ordinary dividend of 7½ per cent, making 10 per cent for the year (against 7½ per cent), and to place £50,000 to general reserve. The balance carried forward is £27,667 (against £19,756 brought in).

Simon-Carves, Ltd., are to make an issue of 850,000 ordinary 5s shares at 22s each. The prospectus will be published on Monday next and application lists will open and close on Thursday.

Associated Electrical Industries, Ltd., has announced a second quarterly interim dividend of 2½ per cent on the ordinary stock. This dividend will be paid on capital of £25 million, including the 5,172,413 shares issued in May last.

Thomas Bolton & Sons, Ltd., have declared an interim dividend of 2½ per cent (unchanged).

C. A. Parsons & Co., Ltd., are paying an unchanged interim dividend of 3¾ per cent.

W. T. Henley's Telegraph Works Co., Ltd., has declared an interim dividend of 2½ per cent on the ordinary stock (unchanged).

A. H. Hunt (Capacitors), Ltd., has declared an interim dividend of 7½ per cent (unchanged).

Increases of Capital

Holliday, Hall & Stinson, Ltd.—Increased by £25,000, in £1 ordinary shares, beyond the registered capital of £25,000.

Electricals, Ltd. — Increased by £25,000, in £1 ordinary shares, beyond the registered capital of £25,000.

Liquidation

Ward's Electrical Services (Westergate), Ltd., radio and electrical engineers.—Winding up voluntarily. Liquidator, Mr. N. F. Trayler, 8-9, Arcade Chambers, Bognor Regis, Sussex, appointed 2nd September.

Bankruptcy

F. Lockett, lately carrying on business at 10, Blackburn Road, Great Harwood, Lancs, electrician and fireplace dealer.—Last day for receiving proofs for dividend 27th September. Trustee, Mr. R. C. Baldwin, Bank Chambers, 2, Lord Street West, Blackburn.

Into the future

THE DEVELOPMENT OF NUCLEAR POWER

Simon-Carves command an outstanding combination of research, engineering and contracting resources for the design and erection of forced-circulation and natural-circulation water-tube boilers and the acceptance of responsibility for the whole of the mechanical, electrical and civil engineering work involved in the building of complete power stations.

These resources are now being brought to bear on the problems of nuclear power production, for the study of which a new organisation has been set up in partnership with the General Electric Company.

With a long tradition of engineering enterprise and a formidable weight of scientific resources, Simon-Carves are preparing to contribute to the development of nuclear power production throughout the world.

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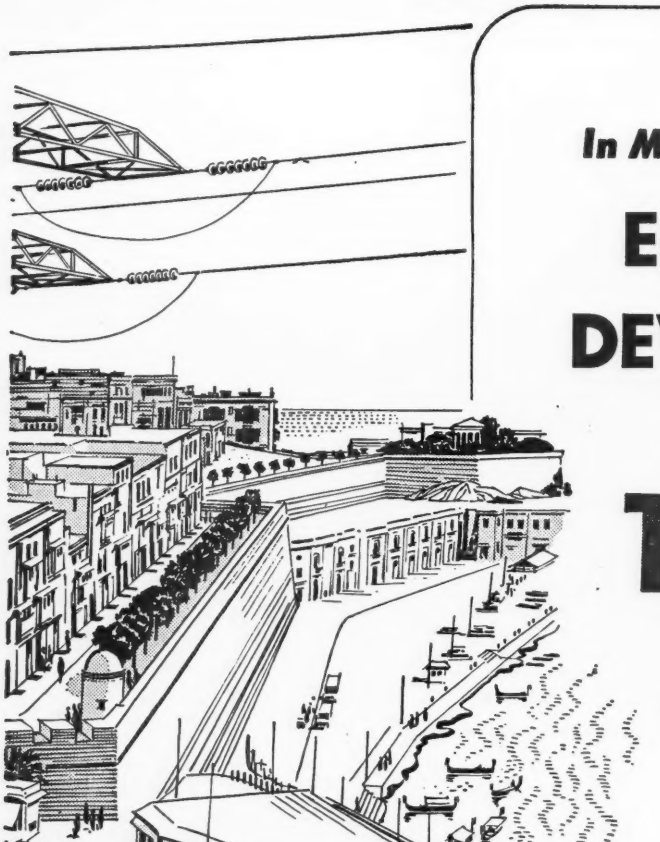
CHEADLE HEATH STOCKPORT ENGLAND

SC 134/PS



In Malta as in Great Britain

ELECTRICAL DEVELOPMENT depends on TUDOR

Tudor are supplying fifty 30-volt self-contained switch tripping equipments to J. G. Statter & Co. Ltd. to whom the Crown Agents, on behalf of the Malta Government, have awarded the contract for supply of the 11 kV switchgear required for reconstructing the distribution system. The Consulting Engineers are Messrs. Preece, Cardew & Rider. The reconstruction involves changing from single phase, 100 cycles to 3-phase, 50 cycles which will enable the l.v. system to be standardised at 415/240 volts, 50 cycles.

FOR OVER FIFTY YEARS The Tudor Accumulator Company has specialised in the design and manufacture of batteries for switchgear operation, indication and emergency duties in power stations and substations; and Tudor Batteries have played a large part in the recent expansion of electricity supply in Britain. Wherever they are in service, Tudor Batteries are noted for their outstanding reliability and low maintenance cost under all conditions.

Tudor engineers will be pleased to prepare a specification of the most economical battery scheme to meet your requirements.

Tudor BATTERIES

T.131

THE TUDOR ACCUMULATOR COMPANY LIMITED · 137 VICTORIA STREET · LONDON · SW1

GENERATION AND DEVELOPMENT

Output in August

Throughout August, as in July, the average weekly temperatures remained above those of last year and this is reflected in the lower rate of increase in electricity generated. The returns of the Ministry of Fuel and Power (Table 1) show that 5,307 million kWh was generated last month, an increase of 5·5 per cent, a rate which, although higher than in July (2·9 per cent) was well below the normal level.

At the end of August the total capacity of plant installed in the stations of the Central Electricity Authority, the South of Scotland Electricity Board and the North of Scotland Hydro-Electric Board was 21,156 MW, representing an addition of 64 MW during the month.

Table 2 analyses the sales of Electricity Boards. The national figures show an increase over August, 1954, of 5·1 per cent, but, when corrected for weather conditions and working days (28·06 against 27·72) the increase is 10·5 per cent.

No account is taken of supplies received by the Area Boards from sources other than the C.E.A.; these are comparatively small and have little effect on the percentage changes.

Sales Promotion in Belfast

There was a net surplus of £114,419 on the past year's working of the Belfast Corporation Electricity Department, but the city electrical engineer and general manager (Mr. R. P. Watson) points out in his 1954-55 report that the full impact of loan charges on the large development programmes now in progress and contemplated, and of recent wage awards, has yet to be felt. In view of the magnitude of the Department's capital commitments, he feels that the time has come "to promote sales with the utmost vigour so as to postpone the necessity for considering an increase in tariffs." A report on staff reorganization to make it possible to embark on a sales programme commensurate with the development of the undertaking has been submitted to the Electricity Committee.

During the year ended 31st March last the Department sold 427·5 million kWh, an increase of approximately 8 per cent on 1953-54. As shown in the accompanying table, the only reduction was in sales to the Transport Department. Large power supplies again increased substantially. At the end of March the total number of consumers was 138,866, an increase of 3,187. Over 10,600 applications for new and additional supplies were dealt with, representing an estimated increase in connected load of almost 30,000 kW.

Class of Consumer	1954/55 Million kWh	1953/54 Million kWh	Inc. or Dec. %
Lighting ..	26·3	24·0	+ 9·412
Domestic ..	116·2	108·2	+ 7·393
General Power ..	210·7	191·2	+10·201
Shipyards ..	45·1	41·5	+ 8·868
Transport Dept. ..	29·2	30·4	− 4·217
Totals	427·5	395·3	+ 8·134

Distribution extensions during the year comprised 20½ miles of h.v. and 23 miles of l.v. cable, with 22½ miles of overhead lines and services. The installation of a 110 kV duplicate interconnector between the West power station and Donegall distributing station was completed.

A total of 544·6 million kWh was generated at the three Belfast power stations last year against 443·9 million kWh in 1953-54. Coal consumption amounted to 312,989 tons (264,248 tons), equivalent to 1·287 (1·333) lb per kWh generated. The average cost per ton was £3 16s 11d (£3 14s 3d), or 0·5306d (0·53d) per kWh generated.

New South Scotland Tariffs

Additional revenue of £2 million a year is needed by the South of Scotland Electricity Board to enable it to meet increases in coal and other costs and to reduce its demands on the capital market. This represents an average increase of about 7½ per cent. Under tariffs containing coal clauses the Board will automatically recover about £850,000 per annum, leaving the balance to be found from other consumers. It is therefore proposed to make increases in the domestic, farm, and certain commercial and industrial tariffs, and, to avoid further tariff changes later, standard tariffs are to be introduced as from 1st October throughout the South of Scotland District. Standard commercial and industrial maximum demand tariffs which vary with the price of fuel, and a standard public lighting tariff also subject to fuel price adjustment, will come into force later. The revised tariffs are as follows:—

DOMESTIC TARIFF.—Charge for primary kWh in Edinburgh and Glasgow (including part of Rutherglen)

TABLE 1.—ELECTRICITY GENERATED AND PLANT INSTALLED*

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Electricity Authority ..	2,556	54	11·5	4,871	3	4,881	4,563	19,281
N. of Scotland H.E.B.	29	1	1·2	44	27	75	73	623
S. of Scotland E.B.	185	5	0·1	348	3	351	331	1,252
Total for August, 1955	2,770	60	12·8	5,263	33	5,307†	4,967	21,156
Corres. total for August, 1954 ..	2,650	75	11·3	4,916	102	5,028	4,719	19,652
Inc. or dec. as a percentage of 1954	+4·5	−20·0	+13·3	+7·1	−67·6	+5·5	+5·3	+7·7
Total to date (8 months) 1955 ..	26,911	732	149·3	50,562	785	51,456	48,357	
Total for corres. 8 months of 1954	24,876	739	92·9	45,715	890	46,698	43,896	
Inc. or dec. as a percentage of 1954	+8·2	−0·9	+60·7	+10·6	−11·8	+10·2	+10·2	

* Comprising all generating stations controlled by the Central Electricity Authority, the North of Scotland Hydro-Electric Board, and the South of Scotland Electricity Board.

† Including generation by other methods amounting to 11 million kWh.

TABLE 2.—ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for August (million kWh)			Twelve Months Totals Ended 31st August (million kWh)		
	1954	1955	Inc. or Dec. %	1954	1955	Inc. or Dec. %
London	375·6	383·4	+ 2·1	5,904·2	6,361·4	+ 7·7
South Eastern	238·8	245·5	+ 2·8	3,535·6	3,840·3	+ 8·6
Southern	291·4	303·1	+ 4·0	4,162·0	4,643·8	+11·6
South Western	160·2	167·3	+ 4·4	2,099·2	2,403·3	+14·5
Eastern	397·9	405·2	+ 1·8	5,736·2	6,299·0	+ 9·8
East Midlands*	346·1	366·6	+ 5·9	4,873·0	5,456·9	+12·0
Midlands*	442·2	451·3	+ 2·1	6,610·7	7,206·0	+ 9·0
South Wales*	279·4	296·7	+ 6·2	3,798·4	4,185·0	+10·2
Merseyside and North Wales* ..	280·1	311·3	+11·1	3,734·8	4,260·9	+14·1
Yorkshire*	460·0	486·9	+ 5·8	6,403·7	7,067·6	+10·4
North Eastern*	286·9	294·5	+ 2·6	3,810·6	4,131·8	+ 8·4
North Western*	531·7	546·3	+ 2·7	7,173·8	7,685·3	+ 7·1
Total all Area Boards	4,090·3	4,258·1	+ 4·1	57,842·2	63,541·3	+ 9·9
Direct Supplies by Central Authority	107·6	152·6	+41·8	1,108·6	1,608·0	+45·0
Grand Total	4,197·9	4,410·7	+ 5·1	58,950·8	65,149·3	+10·5
Mainly Industrial Areas*	2,626·4	2,753·6	+ 4·8	36,405·0	39,993·5	+ 9·9
Mainly Non-Industrial Areas ..	1,463·9	1,504·5	+ 2·8	21,437·2	23,547·8	+ 9·8

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

increased from 3¼d and 4d, respectively, to 4½d/kWh, which is the rate in force for the rest of the District. For secondary kWh the charge throughout the District is to be raised from ⅞d to 1d.

PREPAYMENT METERS. — Domestic consumers, except in Glasgow and part of Rutherglen, have the option of taking supplies through prepayment meters at a slightly higher charge. In future, prepayment meter consumers will pay the same tariff as others, but will be charged a rent of 5s a quarter. This will apply to the whole District, including Glasgow and Rutherglen.

FARM TARIFF.—Existing farm tariffs provide for payment for a number of primary kWh depending on the size of the farm premises and the electrical loading of appliances installed on the farm, subject to a certain minimum sum. The new farm tariff continues the provision that the number of primary kWh is related to the size of the farmhouse, but the number attributable to the farm buildings will be fixed at 100 per quarter. The next 800 per quarter will be charged at 1¼d/kWh, and thereafter at 1d/kWh.

COMMERCIAL AND INDUSTRIAL BLOCK TARIFFS.—Fixed block of 100 kWh per quarter at 4½d/kWh; all further consumption at 1¾d/kWh. This tariff is an alternative to the commercial and industrial two-part tariffs.

CATERING TARIFF. — This tariff, previously in force only in S.W. Scotland, will apply throughout the District. The existing rate of 1d/kWh is being retained, subject to variation in respect of the price of coal.

OFF-PEAK TARIFF.—New tariffs are being introduced to encourage the use of electricity during the Board's off-peak periods. On the current price of coal, off-peak electricity can be purchased at an all-in cost of 0·75d, 0·80d or 0·85d, depending upon the degree of restricted operation of the consumer's installation.

Apart from the Board's larger consumers, accounts are generally rendered four times a year. In Edinburgh, Falkirk, and Kirkcaldy, however, consumers receive accounts three times a year. It has been decided that these consumers shall in future be billed each quarter. To secure economies in meter reading costs, it is proposed that one quarterly account in each year shall be on an estimated reading instead of on an actual meter reading. Any over or under estimation of the meter reading will be automatically corrected when the meter is read three months later.

Scottish Tunnel Completed

The driving of a three-mile tunnel on the Dalchonzie section of the Breadalbane hydro-electric project in Perthshire was completed last week, 3½ months ahead of schedule. At the linking-up in the heart of a mountain, the final error was stated by an official of Sir Murdoch Macdonald & Partners, the consulting engineers, to be within 0·25in on both horizontal and vertical planes. Through the 11ft diameter of the tunnel, water from the River Earn will be carried to a generating station.

Kent Power Station Site

The *Kentish Gazette and Canterbury Press* reports that test borings by the Central Electricity Authority at Richborough for a site for a new power station have been completed. Nine borings have been made and in one case a depth of 118ft was reached before a solid bottom was found. The work has been taking place about two miles from Sandwich near the Ramsgate road.

Lapland Power Station

The Rajakoski power station on the River Paatsjoki in Northern Soviet Lapland, near the Norwegian frontier, is nearing completion. This station, which has been built by the Finns for the Soviet Union, will have a capacity of about 40,000 kW. The first turbine was started up during the latter half of July and the power station was linked up with the Soviet grid on 10th August. A transformer station has been built alongside the station and power cables are being laid to the Petsamo Nickel Mines.

Power Cuts in Skye

Because of the drought, the North of Scotland Hydro-Electric Board has had to impose an electricity cut from 2 p.m. to 5 p.m. in the Isle of Skye.

Additional Power Points

Shipley Council has been given permission by the Minister of Housing to borrow £12,000 for the installation of additional power points in pre-war Council houses.

NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 26th September

LEEDS.—The University, 7.30 p.m. Incorporated Plant Engineers, West & East Yorkshire Branch. "Axial Flow Fans," by R. H. Holbeche.

The University, 7 p.m. I.E.S. Leeds Centre. Third Trotter-Paterson Memorial Lecture: "The Brightness of the Stars," by Sir Harold Spencer Jones.

LEICESTER.—E.M.E.B., Charles Street, 6 p.m. I.E.S. Leicester Centre. "Interesting Lighting Jobs."

Tuesday, 27th September

CARDIFF.—At the South Wales Engineers' Institute, Park Place, 7.15 p.m. Incorporated Plant Engineers (South Wales Branch). "Space Heating," by W. M. Barber.

NORTHAMPTON.—Franklins Gardens Hotel, 7.45 p.m. Institution of Works Managers, Northampton Branch. Annual general meeting.

Wednesday, 28th September, to Friday, 30th September

BOURNEMOUTH. — Town Hall. National Smoke Abatement Society. Annual conference.

Wednesday, 28th September

GLASGOW.—39, Elmbank Crescent, 8 p.m. A.S.E.E. Glasgow Branch. "Motor Control Gear with special reference to Machine Tool Control," by R. F. Mathieson.

LONDON.—School of Hygiene & Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "Extending the Limits of Resistance Measurement Using Electronic Techniques," by G. I. Hitchcox.

SITTINGBOURNE.—A.S.E.E. Kent Branch. Visit to Bowater-Lloyd Pulp & Paper Mill.

Thursday, 29th September

SHEFFIELD. — Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield & District Branch. "Steelmaking and the Plant Engineer," by R. Mayorcas.

Friday, 30th September

BIRMINGHAM.—Imperial Hotel, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "The Do's and Dont's of Refrigeration," by M. E. Lea.

LONDON.—Café Royal, W., 7 for 7.30 p.m. Cromptonian Association. Annual dinner.

NOTTINGHAM.—Bell Inn, 7.30 p.m. Institution of Works Managers, Notts & Derby Branch. Supper and opening of the winter session.

SHEFFIELD.—Grand Hotel, 6.30 p.m. Institute of Metal Finishing, Sheffield & North-East Branch. "Electrodeposits and the Fatigue Strength of Metals," by R. A. F. Hammond (president).

Saturday, 1st October, to Thursday, 6th October

LONDON.—Olympia. International Bakers' & Confectioners' Exhibition.

Saturday, 1st October

LONDON.—I.E.E. London Students' Section. Visit to Brunswick Wharf Generating Station, at 10.30 p.m.

A.S.E.E. South-West London Branch. Visit to Central Criminal Court (Old Bailey).

Chatham Room, Victoria Station, S.W.1, 7 p.m. Royal Engineers' Association (London Group). Dinner-dance.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 7th October:—

ROTALUX. No. 743,018, Class 7. Electrically driven rotary ironing machines.—Silical Water Softeners (Domestic), Ltd., 237, Southampton Way, London, S.E.5.

ISOTRONIC (design). No. 732,369, Class 9. Scientific and electrical apparatus and instruments and parts, but not including static eliminators or any goods of the same description as static eliminators.—Sorensen & Co., Inc., Stamford, Conn., U.S.A. Address for service, c/o Frank B. Dehn & Co., Kingsway House, 103, Kingsway, London, W.C.2.

HOOPRO. No. 743,117, Class 9. Electric conduit fittings, electric switch boxes and switchgear.—Hooper Engineering Products, Ltd., 819, Wolverhampton Road, Causeway Green, Oldbury, Worcester.

ELTRAK. No. 740,296, Class 11. Electric heating and cooking apparatus; and heating elements. — Eltra Kommanditgesellschaft Leicht & Trambauer, Buchnerweg, Germany. Address for service, c/o W. P. Thompson & Co., 12, Church Street, Liverpool.

BICALOHM. No. 743,343, Class 17. Electric insulating materials and articles made from such materials.—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 0d each including postage) will be obtainable after 26th October from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1950

11486. Ericsson Telephones, Ltd., Williams, D. J., Bacon, R. C., and Acton, J. R.—Electric-discharge tubes. 7th May, 1951. (739041.)

18283. British Thomson-Houston Co., Ltd.—Operating circuit arrangements for electric-discharge lamps. 29th June, 1951. (739042.)

28440. General Electric Co., Ltd., Clarke, A. B., and Welch, E. E.—Deposition of adherent layers of powdered material on surfaces by a settling process. 21st November, 1951. (739371.)

1951

13660. Thorn Electrical Industries, Ltd.—Dimming circuits for electric-discharge lamps. 9th June, 1952. (739045.)

18188. Standard Telephones & Cables, Ltd.—Electromagnetic switches. 21st July, 1952. (738973.)

18798. General Electric Co., Ltd., and Rigden, S. A. R.—High-pressure metal-vapour electric-discharge lamps. 1st August, 1952. (739047.)

18965. Jute Industries, Ltd., and Plenderleath, J. S.—Rotary mercury electrical switch. 14th November, 1952. (739048.)

1952

2342. Egle, A., Bethge, W., and Wende, H.—Electric surface heaters. 28th January, 1952. (739153.)

4750. General Electric Co., Ltd., Breadner, R. L., and Simms, C. H.—Manufacture of electrical devices having sealed envelopes including a tubular glass part. 23rd February, 1953. (739053.)

5581. Ericsson Telephones, Ltd., and Melton, H. J.—Electric switching and selecting devices. 4th March, 1953. (739376.)

8539. British Thomson-Houston Co., Ltd.—Electric cut-outs. 3rd April, 1952. (738975.)

9480. Moore, J. R. C.—Frequency-responsive systems and apparatus. 13th April, 1953. (739056.)

9483. Electric & Musical Industries, Ltd.—Formation of films in cathode-ray tubes. 26th March, 1953. (739154.)

9921. Krawinkel, G. H.—Storing electrical signals and transferring the stored signals into a different circuit. 21st April, 1952. (739377.)

14595. Metropolitan-Vickers Electrical Co., Ltd.—Flexible joints for ducts, more particularly for turbines. 9th June, 1953. (739267.)

18283. Hanovia, Ltd., and Sullivan, W. J.—Electric-discharge devices. 9th July, 1953. (739067.)

19510. Igranic Electric Co., Ltd.—Automatic overload electric switches. 1st August, 1952. (739380.)

20088. Electric & Musical Industries, Ltd.—Cathode-ray tube arrangements. 20th July, 1953. (739068.)

21750. Prentice, Ltd.—Rotary electric switches and rotary switch controlled fuse units. 25th August, 1953. (739159.)

22094. British Thomson-Houston Co., Ltd.—Methods of manufacturing magnetic ferrites. 15th July, 1953. (739069.)

23302. C.A.V., Ltd.—Thermally-responsive electric switches. 2nd September, 1953. (739071.)

24989. British Thomson-Houston Co., Ltd.—Electric motor control systems. 6th October, 1953. (739162.)

27865. Caldwell Heaters (Sales), Ltd.—Electrical batteries or holders therefor. 5th February, 1954. (738985.)

30946. Metropolitan-Vickers Electrical Co., Ltd.—Directional waveguide couplers. 18th November, 1953. (739168.)

1953

992. Covill, D. H., and Lovely, J. D.—Output potential control of transformer circuit arrangements. 11th January, 1954. (739176.)

3517. Electric & Musical Industries, Ltd.—Magnetron valves. 2nd February, 1954. (739092.)

5319. Berry, R., and Painton, C. A.—Electric heaters for rooms and the like. 1st March, 1954. Cognate application 8287, 25th March, 1953. (739388.)

7759. Elima, Fabrik für Elektrische Instrumente Messgerate und Apparate Ges.—Electrical measuring instruments. 20th March, 1953. (739281.)

7801. Coulter, W. H.—Electronic amplifier having series-connected output tubes. 20th March, 1953. (739283.)

8329. Worcester Royal Porcelain Co., Ltd.—Electric insulated conductor units. 23rd March, 1954. (739190.)

9833. General Electric Co., Ltd., Jenkins, H. G., and Miles, E. E.—Electric-discharge lamps. 12th April, 1954. (739099.)

10314. Metropolitan-Vickers Electrical Co., Ltd.—Waveguides for electromagnetic waves. 15th April, 1954. (739193.)

10456. Electric Construction Co., Ltd.—Dynamo-electric machines. 23rd March, 1954. (739000.)

13012. Telefunken Ges., formerly Telefunken Ges. für Drahtlose Telegraphie.—Cathode-ray tube arrangements. 11th May, 1953. (739196.)

13203. Walters, A. (personal representative of Walters, A., deceased).—Electric protective devices for neon signs. 5th May, 1954. (739197.)

14065. Elliott Bros. (London), Ltd.—Housings for electric and/or electronic units and sub-units. 18th May, 1954. (739199.)

14234. Aktiebolaget Tudor.—Drying of electric accumulator electrodes. 20th May, 1953. (739009.)

15370. Zenith Radio Corporation.—Television apparatus. 3rd June, 1953. (739393.)

15841. Western Electric Co., Inc.—Travelling wave devices. 9th June, 1953. (739394.)

15853. Radio Corporation of America.—Semi-conductor devices. 9th June, 1953. (739294.)

17222. Philips Electrical Industries, Ltd.—Transistor mixing circuit arrangements. 22nd June, 1953. (739107.)

17799. Mullard Radio Valve Co., Ltd.—Counting and like circuits. 11th May, 1954. (739109.)

17992. Clarostat Mfg. Co. Inc.—Combined variable resistors, capacitors and the like and push-pull switch. 29th June, 1953. (739205.)

19179. Dorman & Smith, Ltd.—Electric circuit-breakers. 18th June, 1954. (739208.)

20363. General Electric Co.—Magnetrons. 22nd July, 1953. (739302.)

21467. Aircraft-Marine Products, Inc.—Electrical connector. 4th August, 1953. (739114.)

28624. Telefonaktiebolaget L. M. Ericsson.—Electric contact means. 16th October, 1953. (739135.)

28643. Erg. Industrial Corporation, Ltd.—Electrical resistors. 22nd June, 1954. (739136.)

30770. Philips Electrical Industries, Ltd.—Continuous manufacture of tubes. 6th November, 1953. (739221.)

30789. Standard Telephones & Cables, Ltd.—Composition of a conductor wire for sealing into glass. 6th November, 1953. (739,030.)

30918. Broadbent & Sons, Ltd., T., and Grimwood, G. L.—Electric motors. 19th October, 1954. (739401.)

31056. General Motors Corporation.—Thermo-electric switches. 10th November, 1953. (739143.)

31557. British Thomson-Houston Co., Ltd.—Electrical spark ignition arrangements. 10th November, 1954. (739223.)

32879. General Electric Co.—Systems for detecting wheel-slip of electrically driven vehicles. 26th November, 1953. (739147.)

33509. General Electric Co.—Cooling and insulating of electrical equipment. 2nd December, 1953. (739035.)

34047. Bosch Ges., R.—Electric hand machine tool. 8th December, 1953. (739226.)

35198. General Electric Co.—Thermostatic electric switches. 17th December, 1953. (739230.)

1954

47. Standard Telephones & Cables, Ltd.—Thermionic cathode heaters. 1st January, 1954. (739325.)

284. General Electric Co.—Two-temperature refrigerating system. 5th January, 1954. (739330.)

747. Philips Electrical Industries, Ltd.—Electric incandescent lamps of the kind comprising at least one main filament and one screened dimming filament. 11th January, 1954. (739337.)

1262. Philips Electrical Industries, Ltd.—Dispenser cathodes. 15th January, 1954. (739232.)

1299. Prosperity Co., Inc.—Electric motor driving systems. 15th January, 1954. (739235.)

1562. Naamlooze Vennootschap Maatschappij Koffiepellerij Blaauwhoedenveem.—Photo-electrical sorting machines. 19th January, 1954. (739247.)

1706. General Motors Corporation.—Electrical apparatus for testing and calibrating the light-sensitivity of a photo-electric cell. 20th January, 1954. (739340.)

1835. Standard Telephones & Cables, Ltd.—Circuit arrangement for audio frequency amplifiers with forward-acting gain control. 21st January, 1954. (739342.)

2159. Philips Electrical Industries, Ltd.—Devices for producing pulsatory X-rays. 25th January, 1954. (739355.)

2766. Philips Electrical Industries, Ltd.—Television camera tubes. 29th January, 1954. (739362.)

2891. Westinghouse Electric International Co.—Electron emissive electrodes for electrical-discharge devices. 1st February, 1954. (739367.)

2901. Bondon, L. A.—Coaxial electric transmission line spacing assembly. 1st February, 1954. (739368.)

3111. Krause, J. F.—Adjustable electro-acoustic transducers. 2nd February, 1954. (739370.)

3310. Casamada, F. R., Arnaiz, A. M., and Llorens, F. R.—Electromagnetic apparatus. 4th February, 1954. (739,406.)

3440. Bachmann, O.—Fusing of electrodes into glass on quartz tubes. 5th February, 1954. (739408.)

3534. Goodall, J. S. H., and Chapman, G. S.—Electronic overload protection device incorporating a variable electronic delay. 6th February, 1954. (739413.)

3577. Siba-Elektrik Ges.—Construction of dynamo-electric machines. 8th February, 1954. (739414.)

3653. General Electric Co.—Core structures of electric three-phase transformers. 8th February, 1954. (739416.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—7th October. Brisbane City Council. 20,000 a.c. meters. (E.S.B. 19357/55. Ten/15584.)* 11th November. Electrical control switchboards and equipment. (E.S.B. 19358/55. Ten/15591.)*

10th October. Electricity Commission of New South Wales, Sydney. 20 MVA, 132/11 kV oil immersed, outdoor, weatherproof, self-cooled, double wound 3-phase transformer for Carlingford substation. (E.S.B. 19073/55. Ten/15497.)* 10 MVA, 66 kV power transformer for Yanco substation. (E.S.B. 19137/55. Ten/15503.)*

12th October. Southern Electricity Authority of Queensland, Brisbane. 20 MVA transformer. (E.S.B. 19191/55. Ten/15533.)*

3rd November. Posts and Telegraphs, G.P.O., Melbourne. Transmitting and rectifying tubes of various types. (E.S.B. 19622/55. Ten/15624.)*

Ballycastle (Co. Antrim).—6th October. Board of Management. Electrical installation at new intermediate school, Mary Street. Varming & Mulcahy, consulting engineers, 37, Malone Road, Belfast.

Belfast.—8th October. Harbour Commissioners. Two electrically driven sewage pumps in a pumping station to be erected at West Twin. Harbour engineer, Harbour Offices.

Biggleswade.—10th October. U.D.C. Street lighting equipment. (See this issue.)

Bury.—1st October. Town Council. Electrical installations at gymnasium, etc., at Elton Modern School, at extensions to East Ward School, and at Brandlesholme County Primary School. Borough surveyor, Town Hall.

Costa Rica.—5th October. Instituto Costarricense de Electricidad, San Jose. Steel reinforced aluminium cable for the Colima-Heredia transmission line. (E.S.B. 19449/55. Ten/15629.)* 6th October. Material for the Colima-Uruca transmission line. (E.S.B. 1950/55. Ten/15630.)*

Durham.—County Council. Electrical installation at Fire Brigade Headquarters. (See this issue.)

Edinburgh.—30th September. City Council. Passenger lift at 14, Queen Street. City architect, City Chambers.

Greece.—15th October. General Directorate for Telecommunications, Athens. Telecommunications equipment. (E.S.B. 18942/55. Ten/15530.)*

Horsham.—17th October. U.D.C. Street lighting equipment. (See this issue.)

India.—29th September. Madhya Pradesh Electricity Board, Nagpur. Three 2,000 kW diesel generating sets and ancillary equipment. (E.S.B. 18332/55. Ten/15439.)*

30th September. Damodar Valley Corporation, Alipore. Electric lighting fittings and accessories (indoor and outdoor). (E.S.B. 19346/55. Ten/15568.)*

3rd October. Madras Electricity Department. H.v. and l.v. cables. (E.S.B. 19526/55. Ten/15612.)*

25th November. Bombay Electricity Board. Two 15,000 kW turbo-alternators and two 200,000 lb/hr boilers with ancillary equipment for Utran power station. (E.S.B. 19351/55. Ten/15590.)*

Iraq.—29th September. Directorate General of Municipalities, Baghdad. 75 kW d.c. diesel generating set for Hamman Al-Alil. (E.S.B. 475/55. Ten/12136B.)* In the absence of any tender complying with the conditions of contract and specification, the previous notice has been cancelled.

Kendal.—15th October. Corporation. Street lighting equipment. (See this issue.)

New Zealand.—27th October. Director-General (Stores Division), G.P.O., Wellington. Capacitors. (E.S.B. 19204/55. Ten/15513.)* 4th November. 9-conductor cordage. (E.S.B. 19203/55. Ten/15511.)*

22nd November. State Hydro-Electric Department, Wellington. 11 kV indoor switchgear for Atiamuri power station. (E.S.B. 19134/55. Ten/15505.)* 24th January. 15,000 kVA, 11/11/50 kV transformer bank and spare unit together with a 3-phase 11 kV earthing transformer. (E.S.B. 19135/55. Ten/15515.)*

Pakistan.—11th November. Posts and Telegraphs Department, Karachi. Private manual and automatic branch exchanges. (E.S.B. 19293/55. Ten/15555.)*

South Africa.—29th September. Union Tender and Supplies Board, Pretoria. Transformers, bulkhead fittings, rectifier stocks, welding set, time switches and insulated cable. (E.S.B. 19365/55. Ten/15560.)* Electric motors with reduction gear boxes for the State Sawmill, Blyde. (E.S.B. 19364/55. Ten/15562.)*

5th October. Stores Department, South African Railways, Johannesburg. Insulating tape. (E.S.B. 18904/55. Ten/15453.)*

Southend-on-Sea.—8th October. Corporation. Lighting scheme for municipal airport. (See this issue.)

Southern Rhodesia.—5th October. Bulawayo Electricity Department. 600 single-phase house service meters. (E.S.B. 18941/55. Ten/15478.)* 19th October. H.v. and l.v. overhead line equipment. (E.S.B. 19391/55. Ten/15583.)*

Spain.—16th January. Ministry of Public Works, Madrid. Autocars, electric tractor coaches and trailer coaches for narrow gauge railways. (E.S.B. 19252/55. Ten/15532.)*

Stamford.—10th October. Corporation. Street lighting equipment. (See this issue.)

Thailand.—25th October. U.S. Department of Commerce, Civil Aeronautics Administration, Chief Procurement Branch. Direction finder system and remote control equipment. (E.S.B. 18982/55. Ten/15550.)*

United States.—11th October. Bureau of Reclamation, Denver, Colorado. One 115 kV circuit-breaker. (E.S.B. 18979/55. Ten/15589.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bolton.—County grammar school, Smithills (£177,725), R.C. primary school, Breightmet (£47,432), and county primary school, White Bank (£31,000); P. S. Rennison, town clerk, Town Hall.

Bournemouth.—Office block; Gray-Taylor Properties, Ltd., 31, Dover Street, London, W.1.

Bradford.—Villas for aged persons on sites at The Park (£75,000); W. H. Leathem, town clerk, Town Hall.

Burnley.—Bus garage for Ribble Motor Services, Ltd.; staff architect, Frenchwood Avenue, Preston.

Cannock.—Library, town centre; H. Wilcox, architect, High Green.

Canterbury.—Maisonnettes (24), Military Road; city architect.

Chesterfield.—Factory at Hackenthorpe (£100,000); British Furtex, Ltd., pile fabrics, Burgess Road, Sheffield, 9.

Coventry.—Research laboratory, Torrington Avenue, for Powderloys, Ltd.; H. Clarke & Sons, Ltd., Coronation Road.

Dwellings (111), Willenhall neighbourhood; A. H. Gardner & Partners, architects, 11, Eaton Road.

Dumfries.—Houses (100), Lochside; Scottish Special Housing Association, Ltd., Palmerston Place, Edinburgh.

Falmouth.—Storage and distribution depot, Ashfield; Shell Mex & B.P., Ltd., Shell Mex House, London, W.C.2.

Honiton.—New wing at Marlpits Hospital (£30,000); secretary, East Devon Hospital Group Management Committee, Redhills House, St. Thomas, Exeter.

Huddersfield.—Secondary modern school (£200,000), boys' grammar/technical school (£300,000), and girls' grammar/technical school (£240,000), all on the Salendine Nook site; J. G. L. Poulson, architect, 29, Ropergate, Pontefract.

Huntingdon.—Dwellings (42), American Lane estate; F. B. Thackray & Co., Ltd., Huntingdon.

Littleport.—Swimming pool with ancillary buildings; A. E. King, architect, 1a, Lynn Road, Ely.

Longbenton (Northumberland).—Church of England; Newcombe and Newcombe, architects, 23, Eldon Square, Newcastle-on-Tyne.

Maidstone.—Rebuilding premises at 15-19, Middle Row; Barclays Bank, Ltd., Head Office, 54, Lombard Street, London, E.C.3.

Manchester.—R.C. secondary school at Gorton Lane, Gorton; Greenhalgh & Williams, architects, 15, Mawdsley Street, Bolton.

Maryport.—Factory additions for Electroflo Meters, Ltd.; John Laing and Sons, builders, Dalston Road, Carlisle.

Middlesbrough.—C. of E. church, The Greenway, Thorntree estate; W. E. Haslock, architect, 143, Albert Road.

Newport (Mon).—Home for aged persons (£66,940); E. A. Middle, borough surveyor, Civic Centre.

Oldbury.—Office block, Dudley Road, for Edwin Danks & Co., Ltd.; Wilson Lovatt & Sons, Ltd., Clarence Street, Wolverhampton.

Sheffield.—Erection of factory on site opposite Victoria Works, Archer Road (£500,000); Laycock Engineering, Ltd., Archer Road, Millhouses, 8.

South Shields.—Hotel, Harton Lane, for Rowell and Son; Page, Son and Hill, architects, 75, King Street.

Spennymoor.—Council houses (30); G. H. Gray, 52, Camden Street, North Shields.

Stafford.—New church at Tillington Hall estate; B. Miller, architect, 39, Bluecoat Chambers, School Lane, Liverpool.

Stockton-on-Tees. — Church, Roseworth (£25,000); D. and J. Ranken, Ltd., builders, Stockton Road, Sunderland.

Sunderland.—Demolition of slums and erection of 94 houses at Ryhope (£131,149); C. Emmerson, R.D.C. surveyor, The Esplanade.

Tonbridge.—Houses and bungalows on new estates at Tonbridge, Tunbridge Wells and in Maidstone area; Perryman Estates, Ltd., developers, 7, Castle Street.

Warrington.—Extensions to factory at Ellesmere Street for Thos. Locker & Co., Ltd.; A. Monk & Co., Ltd., Padgate, Warrington.

West Bromwich.—Extensions to factory at Lyng Lane for Retson Co., Ltd.; W. Kendrick & Sons, Ltd., Tasker Street, Walsall.

Workington.—Additions to the factory of Workington Rayon Mills, Ltd.; R. Ward and Partners, architects, 33, St. George's Drive, London, S.W.1.